



# U.S. SPACE INDUSTRY 'DEEP DIVE'

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A COLLABORATION BETWEEN THE DOC AND THE USAF, NASA, AND NRO

## FIRST WAYPOINT PRELIMINARY FINDINGS

# U.S. Space Industry 'Deep Dive' Assessment - Background

- Partnership with the U.S. Air Force, National Aeronautics and Space Administration, and the National Reconnaissance Office.
- The principle goal is to gain an understanding of the intricate supply chain network supporting the development, production, and sustainment of products and services across the defense, intelligence, civil, and commercial space sectors.
- Objectives:
  - a) Map the space industrial base supply chain in unprecedented detail;
  - b) Identify interdependencies between respondents, suppliers, customers, and USG agencies;
  - c) Benchmark trends in business practices, competitiveness issues, financial health, etc. across many tiers of the industrial base; and
  - d) Share data with USG stakeholders to better inform strategic planning, targeted outreach, and collaborative problem resolution.

# U.S. Space Industry 'Deep Dive' Assessment

## - Background (cont.)

- All partners worked together to develop a survey that **minimized industry's burden** and meet the **objectives of all stakeholders**.
  - Open and cooperative collaboration between partners was critical to making this assessment as success.
  - All partners will receive the survey data – they know best how to use this information to support their respective missions.
- In June 2012, the 'Deep Dive' survey was distributed to approximately 9,150 organizations, including companies, universities, non-profits, and USG agencies.
- The collection is divided into three, three-month long waypoints. We have reached the first waypoint.
  - The data in this presentation is based on surveys collected in the first three months.

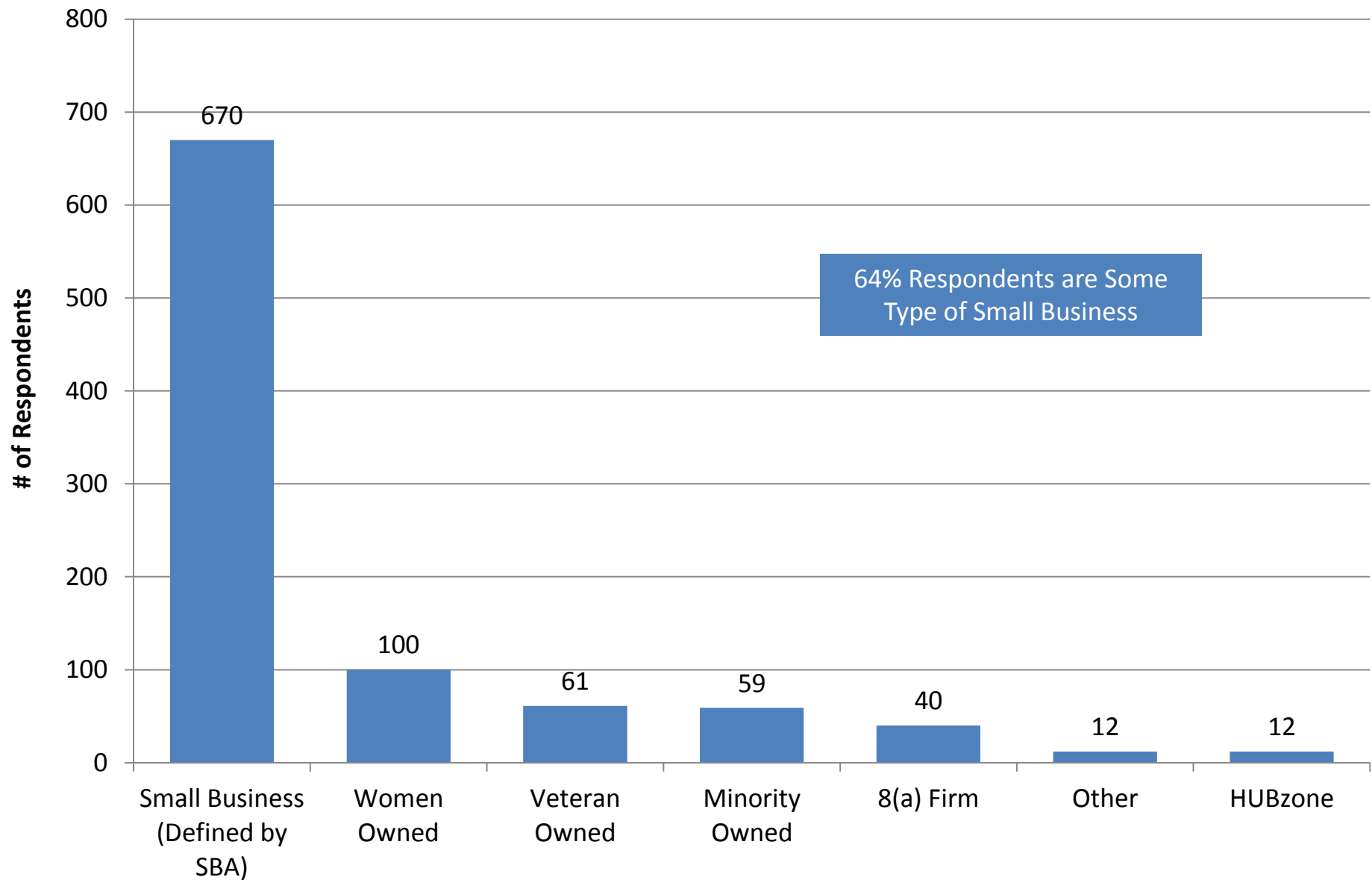
# Overview of First Waypoint Data

Respondents by Type of Organization	
Commercial Companies	1,018
Universities	42
Non-Profit Organizations	19
U.S. Government Agencies	8
<b>Total</b>	<b>1,087</b>

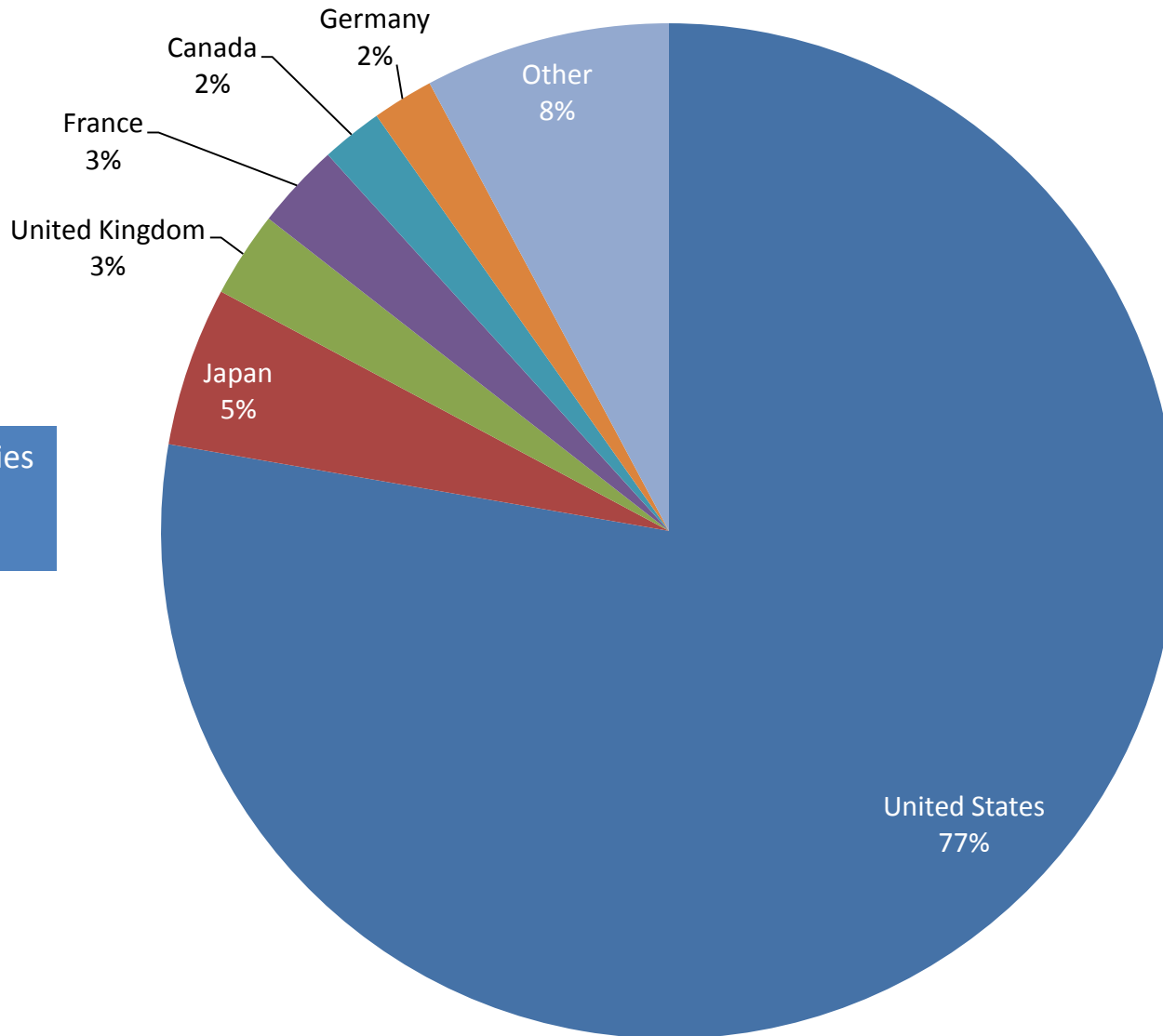
First Waypoint Respondents by Average Annual Net Sales (2009-2012)	
Very Small (Less than \$5M)	433
Small (\$5 – 10M)	140
Medium (\$10 – 50M)	278
Large (\$50 – 250 M)	151
Very Large (Greater than \$250 M)	85

64% Respondents are small businesses, as defined by the Small Business Administration

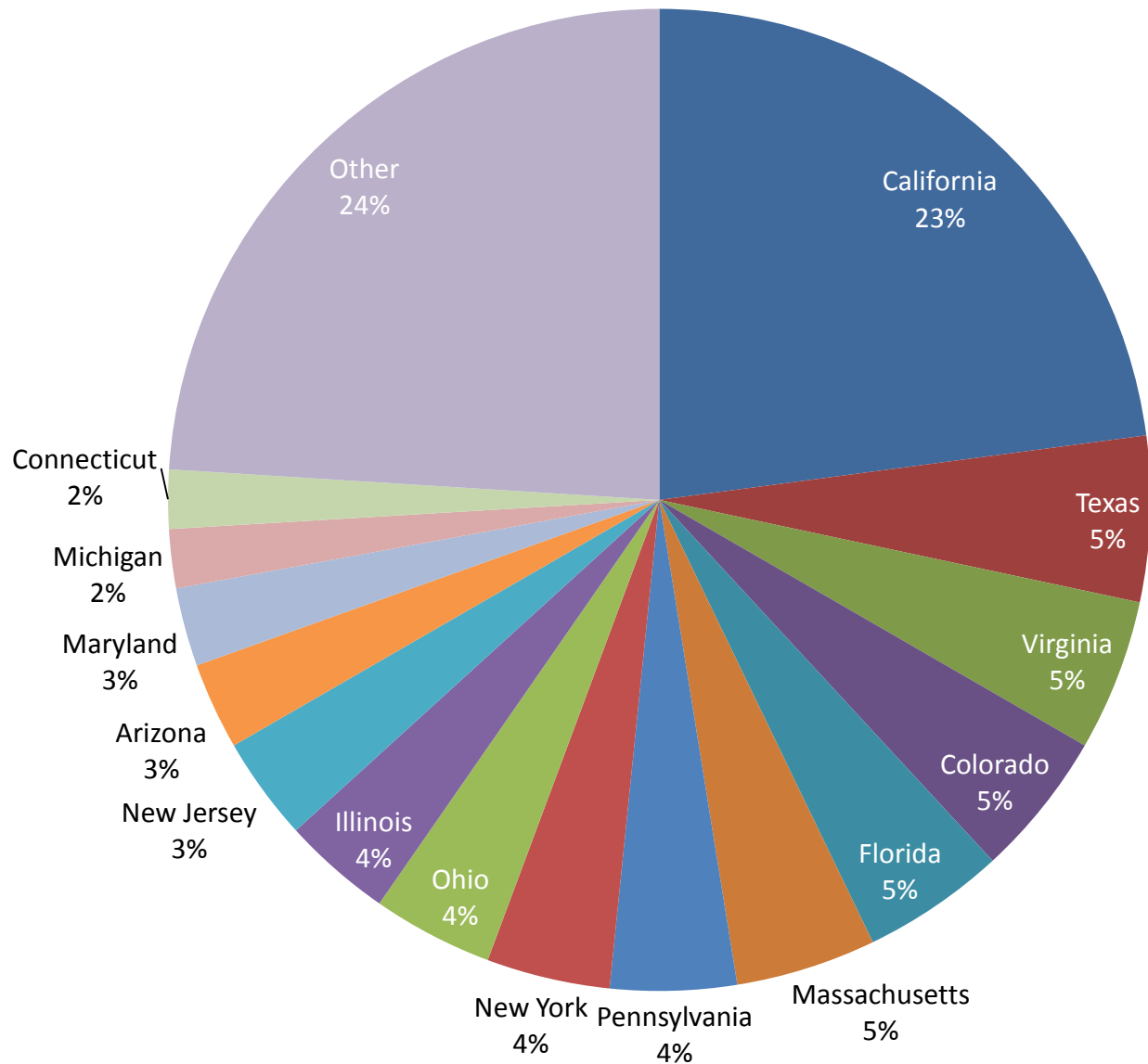
# Self-Identified Small Businesses by Type



## Location of Respondent Parent Companies

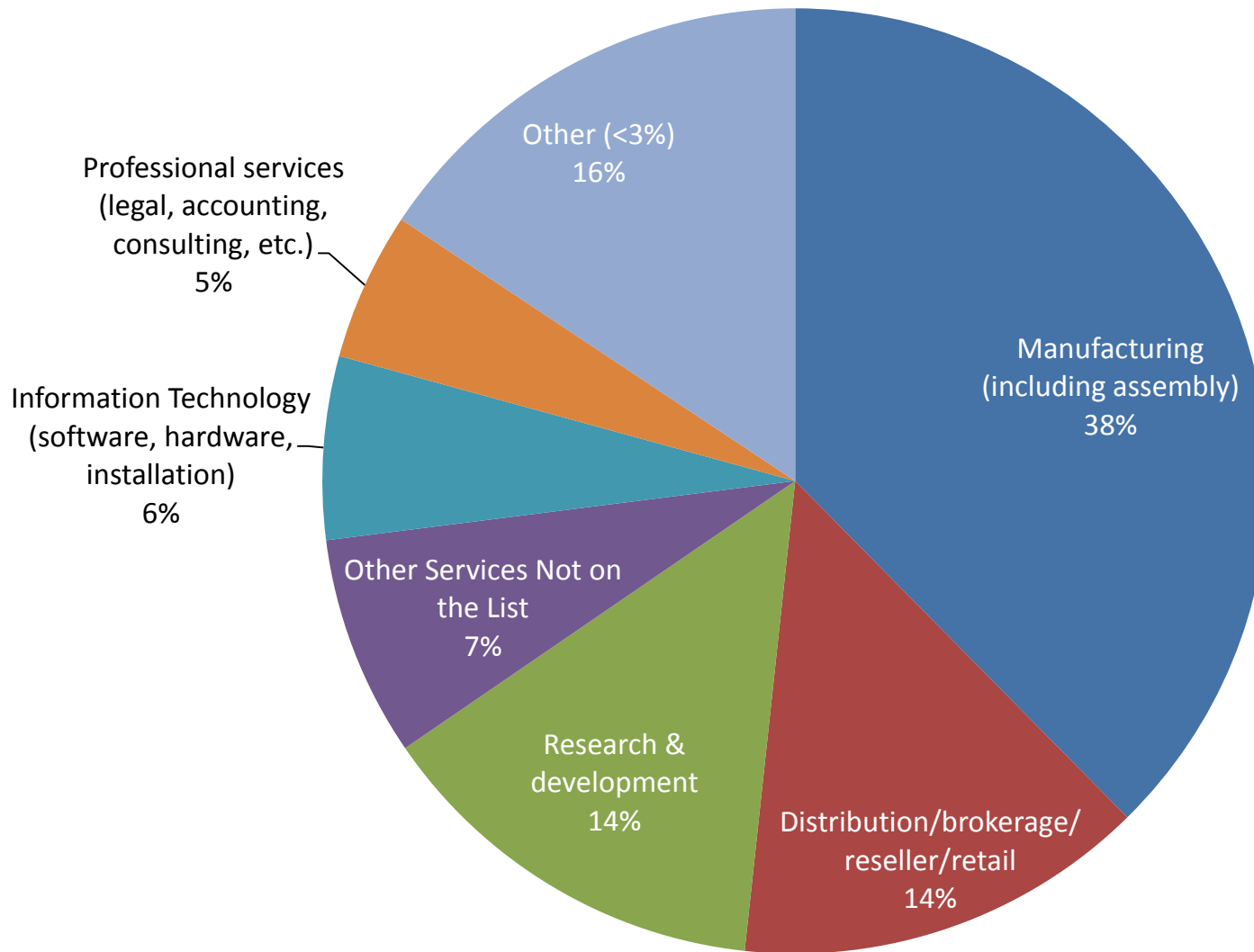


# U.S.-Based Respondents by State



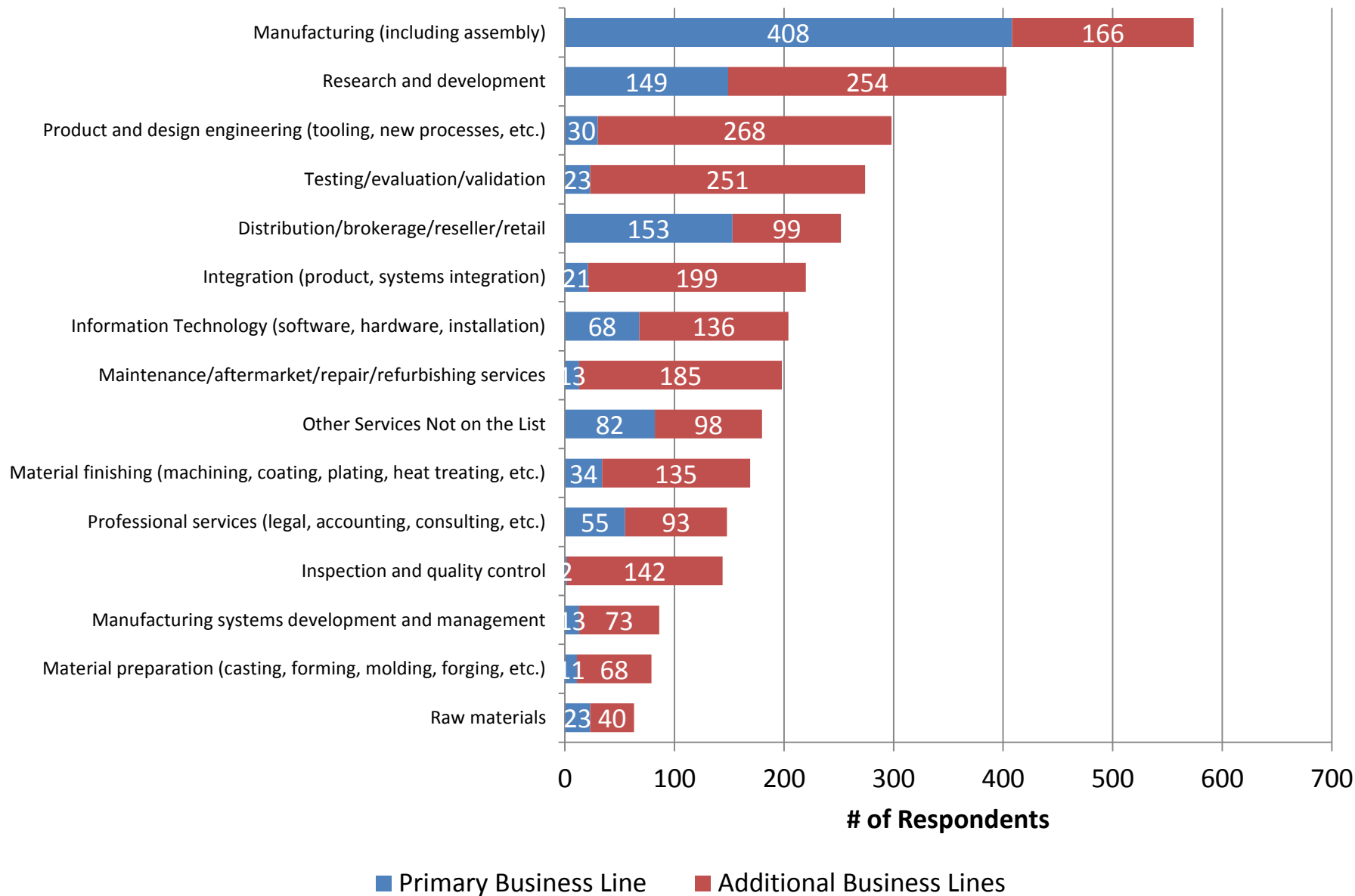
Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

## Respondents' Primary Business Line



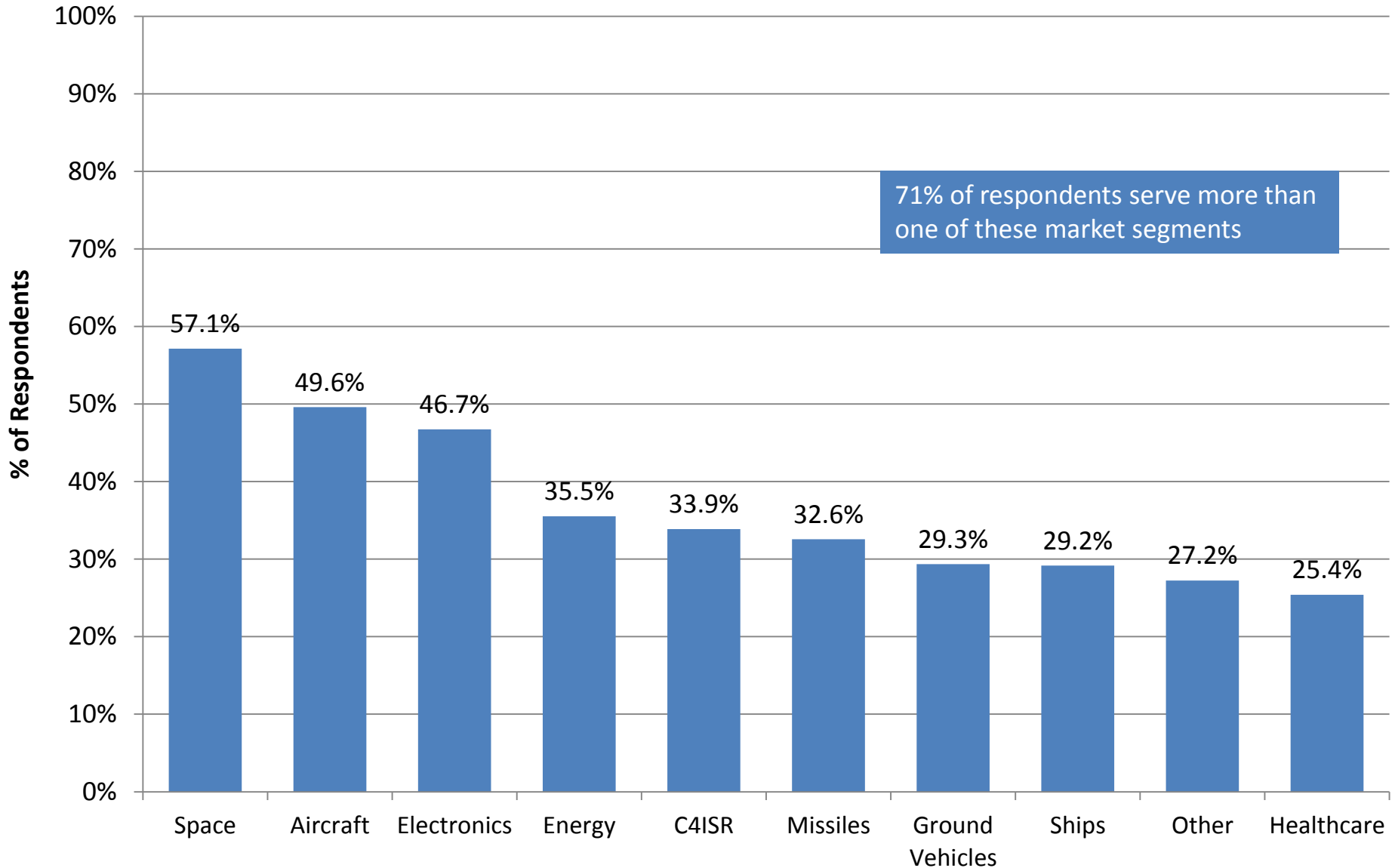


# Respondents' Primary and Additional Business Lines



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

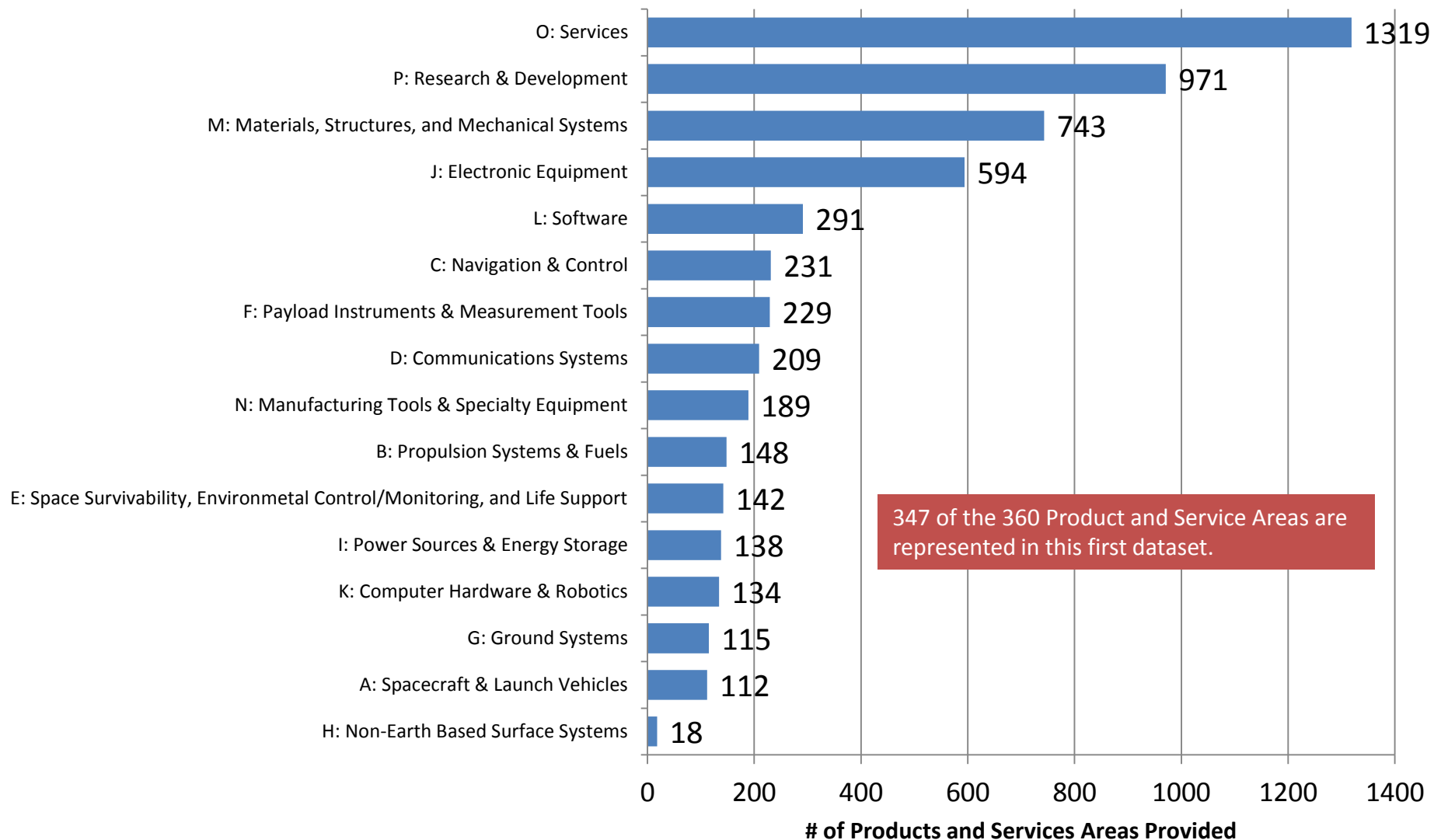
# Percent of Respondents Serving Selected Market Segments



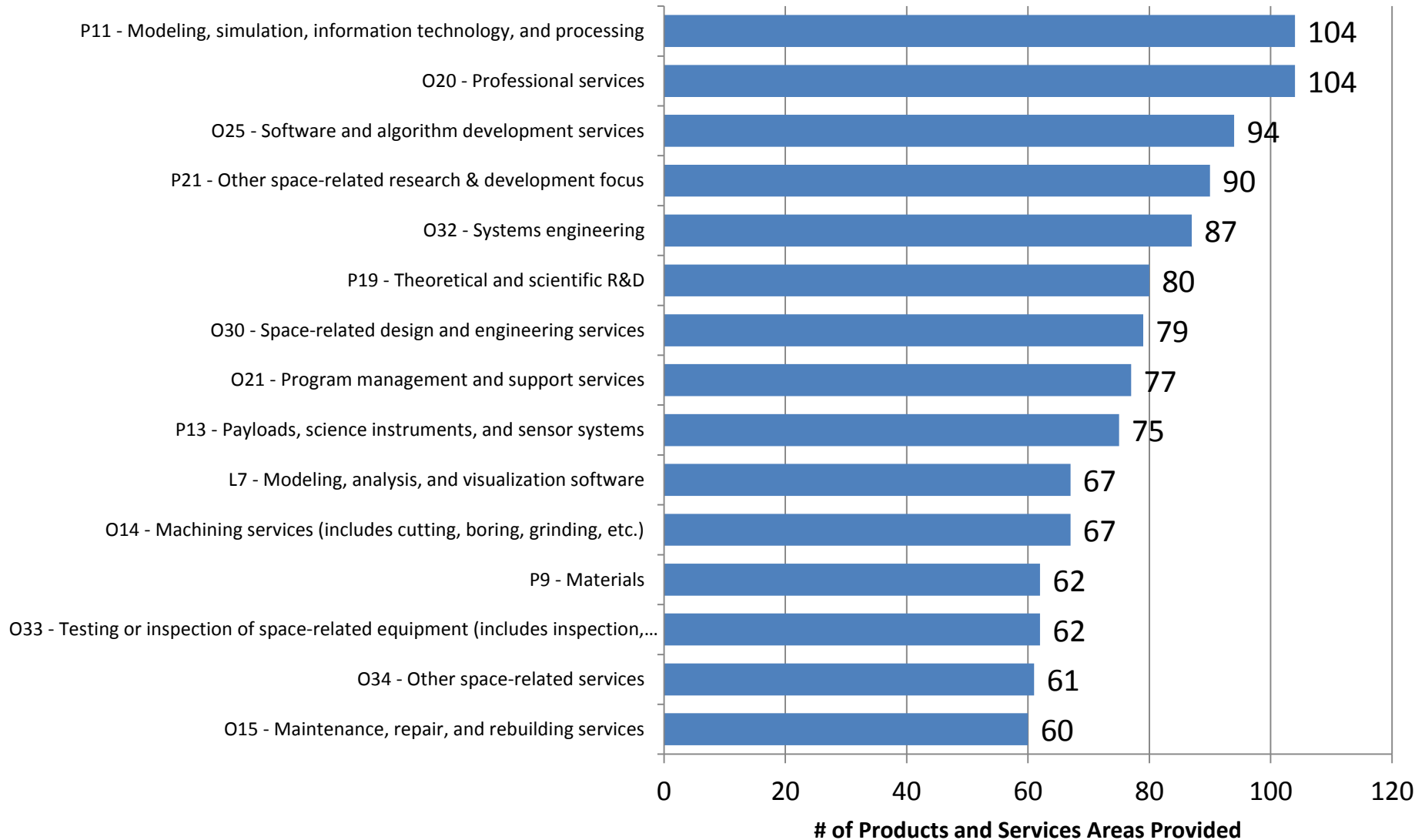
# The Product and Service List

- The Product and Service List is comprised of 360 individual products and services, grouped into 16 general segments.
- The list is designed to capture how respondents fit into the space industrial base.
- Product and Service Segments:
  - A. Spacecraft & Launch Vehicles
  - B. Propulsion Systems & Fuels
  - C. Navigation & Control
  - D. Communications Systems
  - E. Space Survivability, Environmental Control/Monitoring, and Life Support
  - F. Payload Instruments & Measurement Tools
  - G. Ground Systems
  - H. Non-Earth Based Surface Systems
  - I. Power Sources & Energy Storage
  - J. Electronic Equipment
  - K. Computer Hardware & Robotics
  - L. Software
  - M. Materials, Structures, and Mechanical Systems
  - N. Manufacturing Tools & Specialty Equipment
  - O. Services
  - P. Research & Development

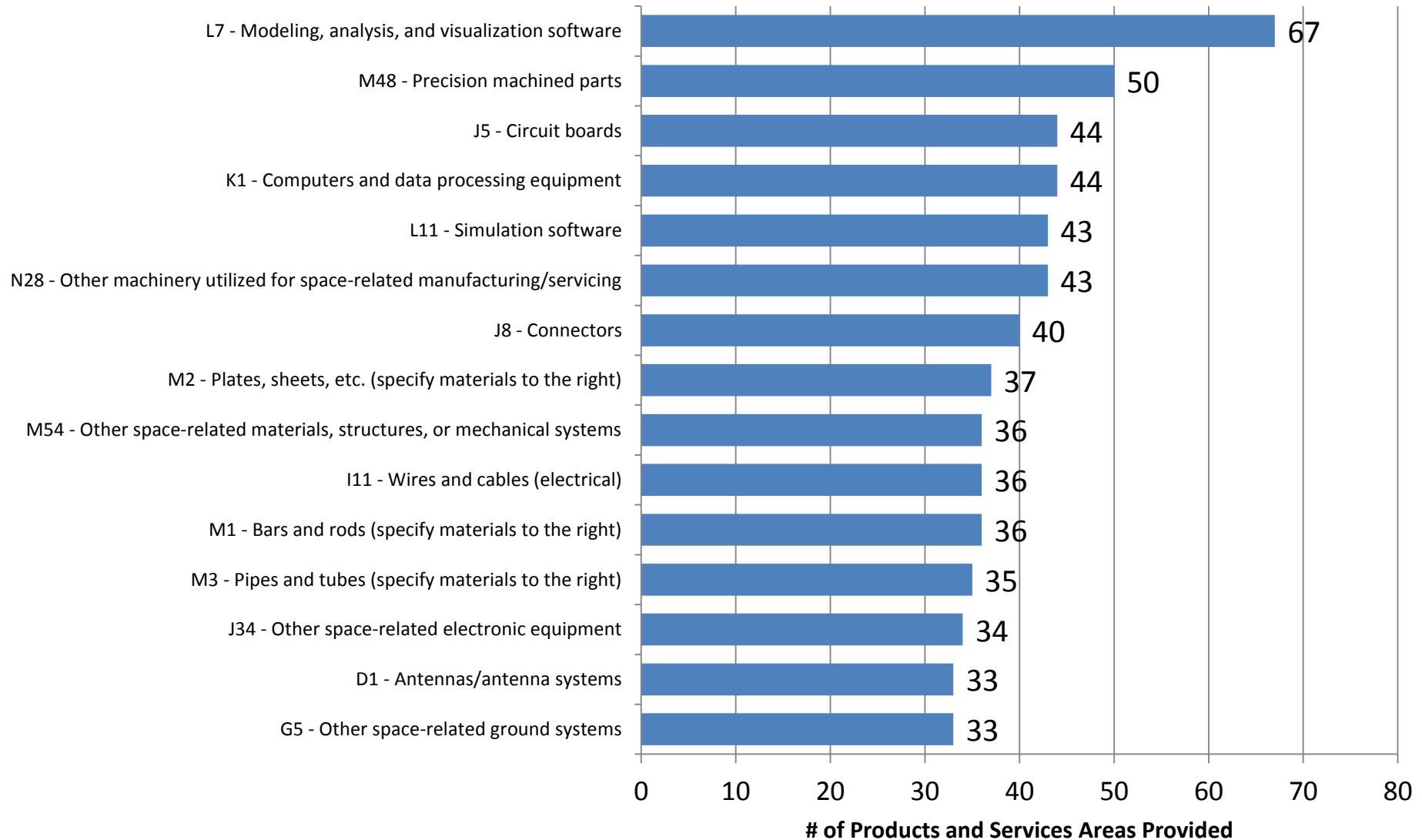
# Products and Services Provided by Segment



## Top 15 Product/Service Areas Provided by Respondents – All Segments

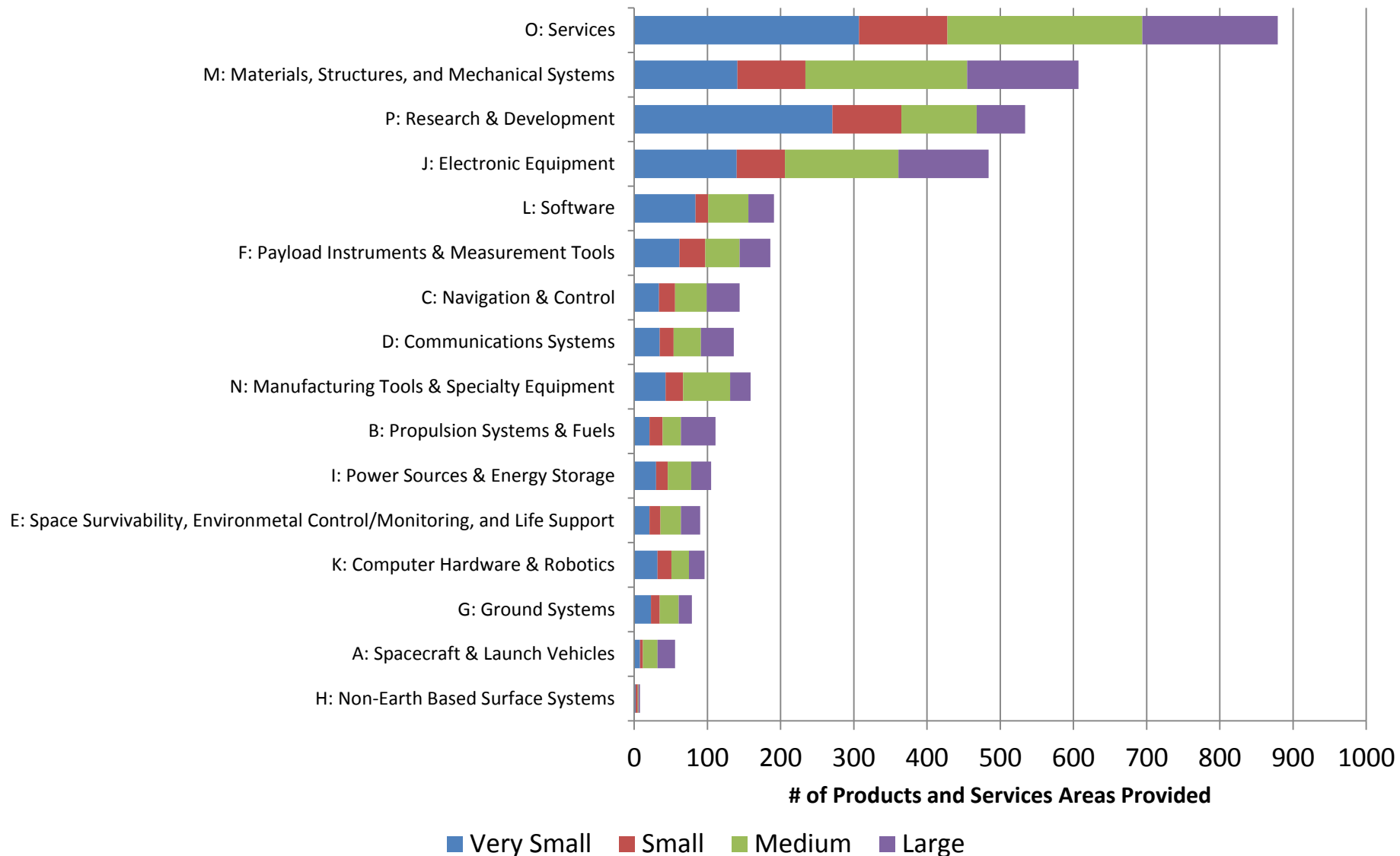


## Top 15 Product/Service Areas Provided by Respondents – Excluding Services and R&D

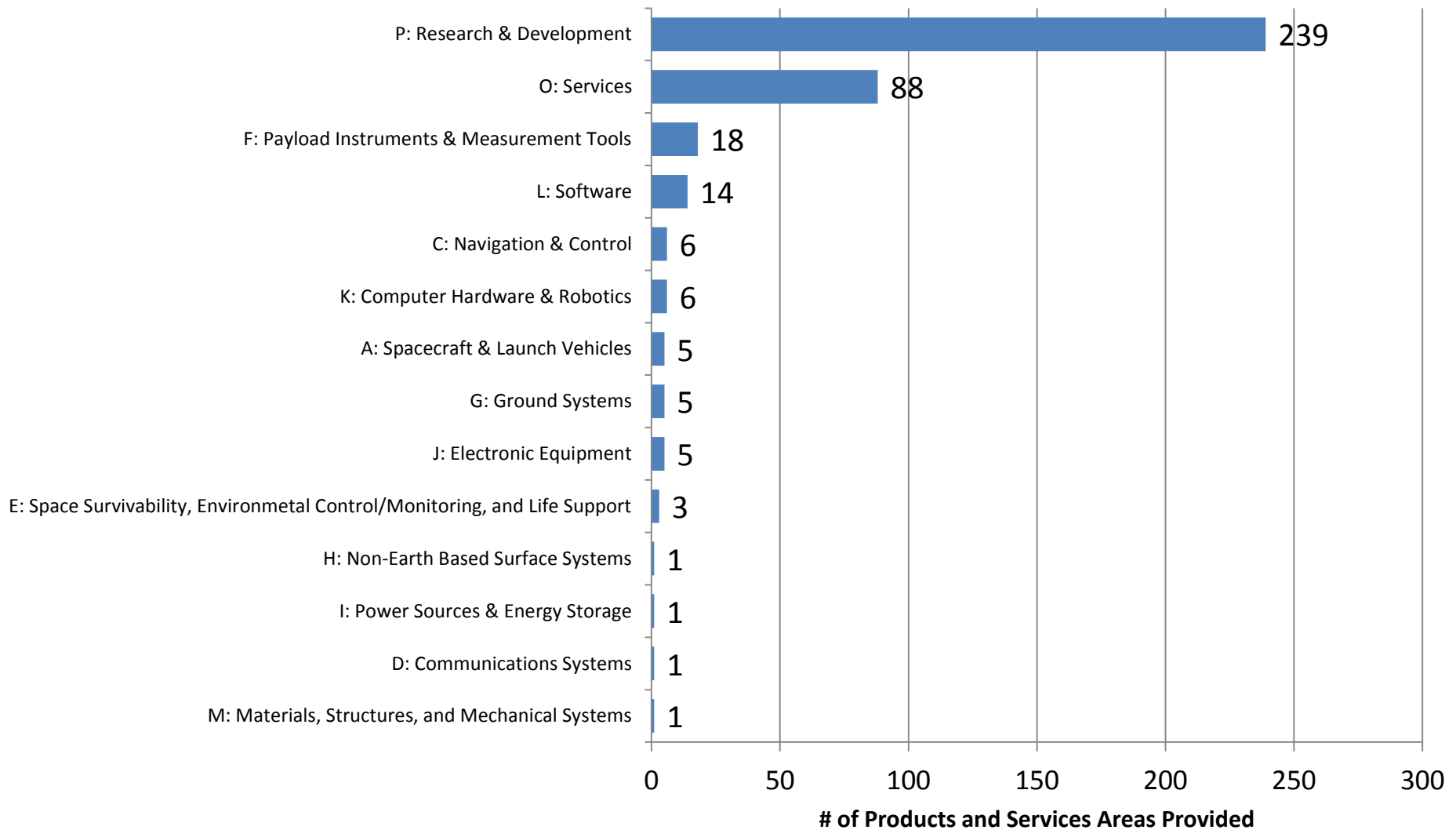


# Products and Services Provided by Commercial Organizations

## - By Organization Size



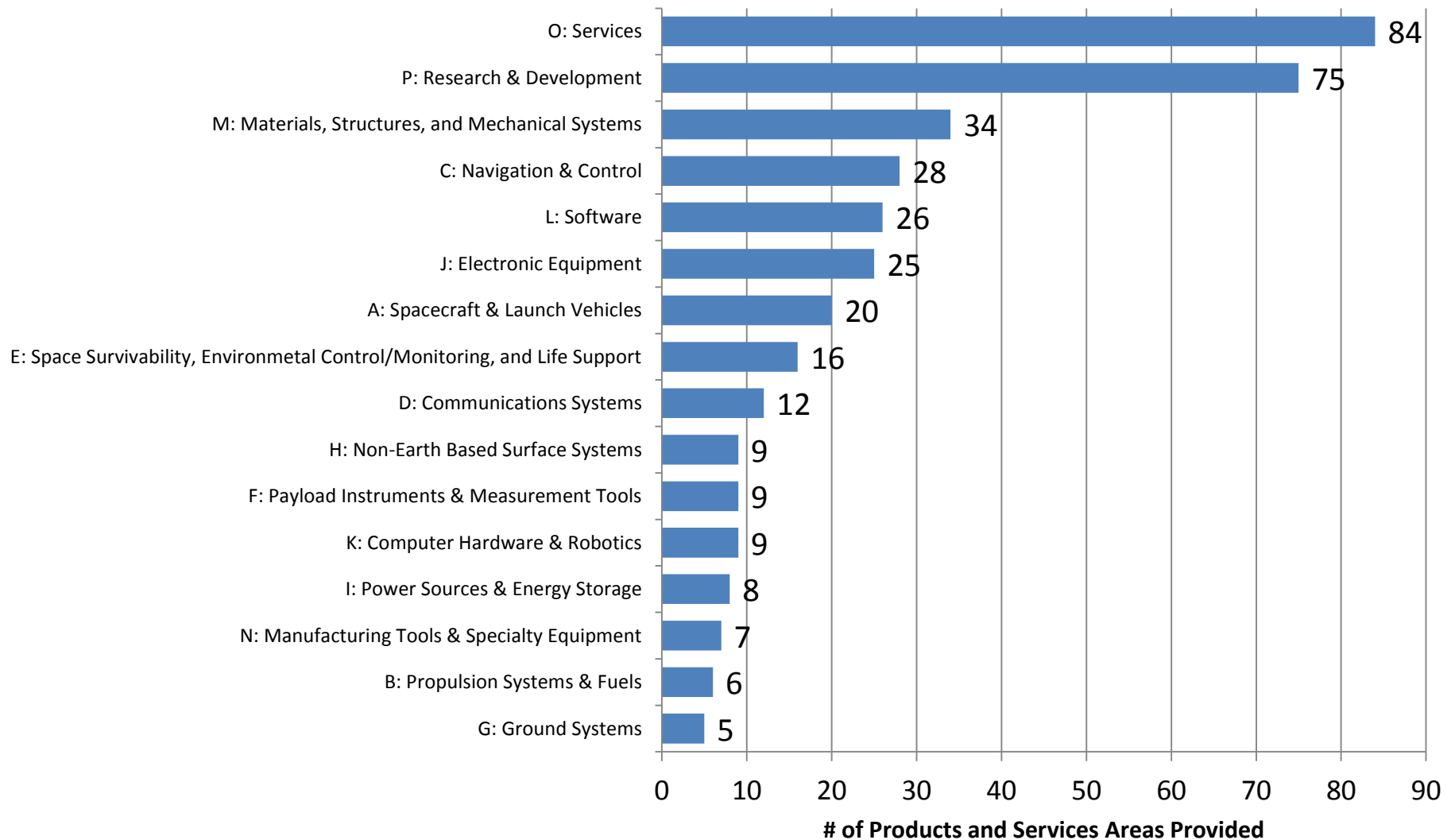
# Products and Services Provided by Universities\*



\* Based on 42 responses from universities.



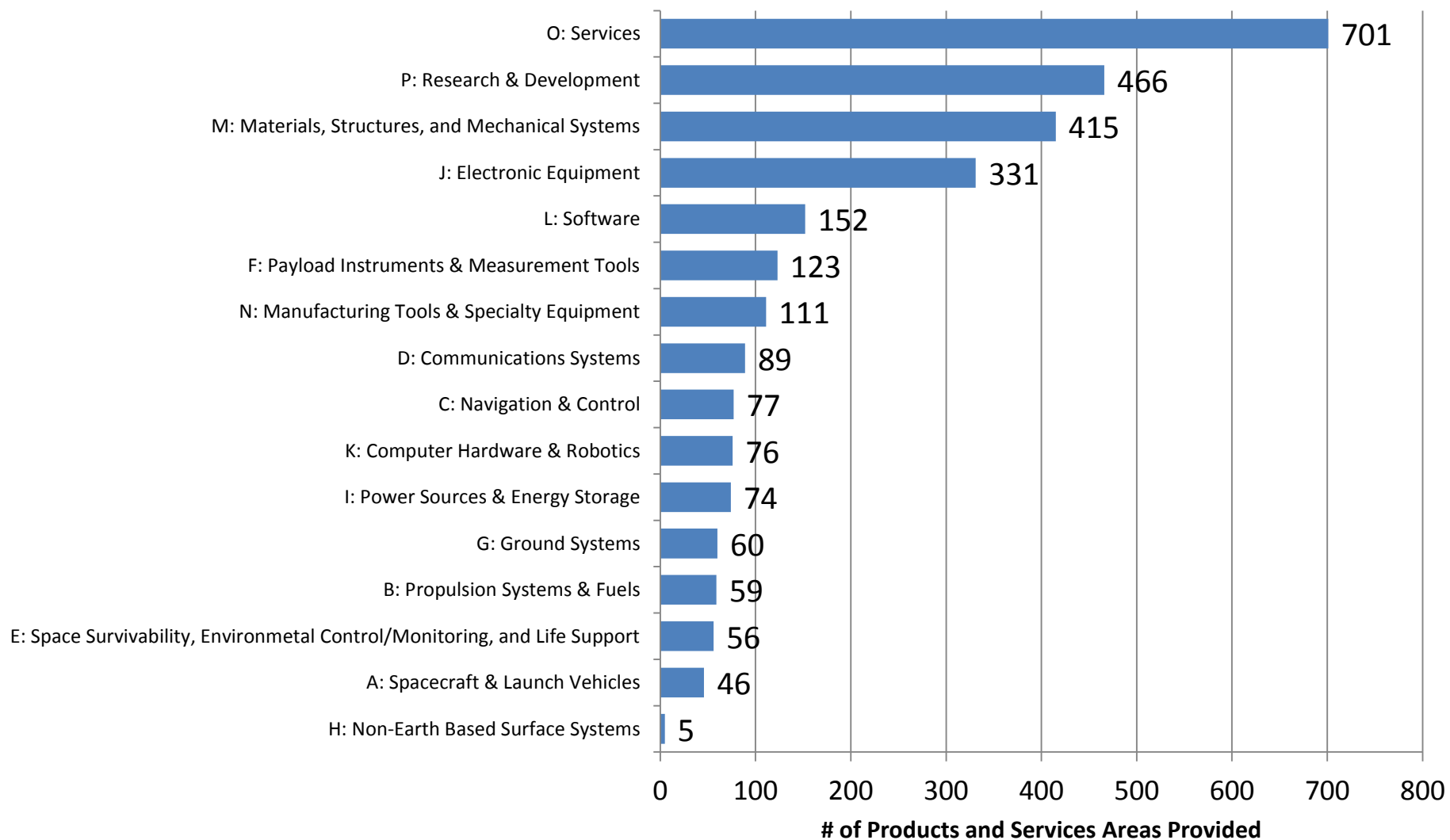
## Products and Services Provided by U.S. Government Organizations\*



\* Based on 8 responses from U.S. Government organizations.

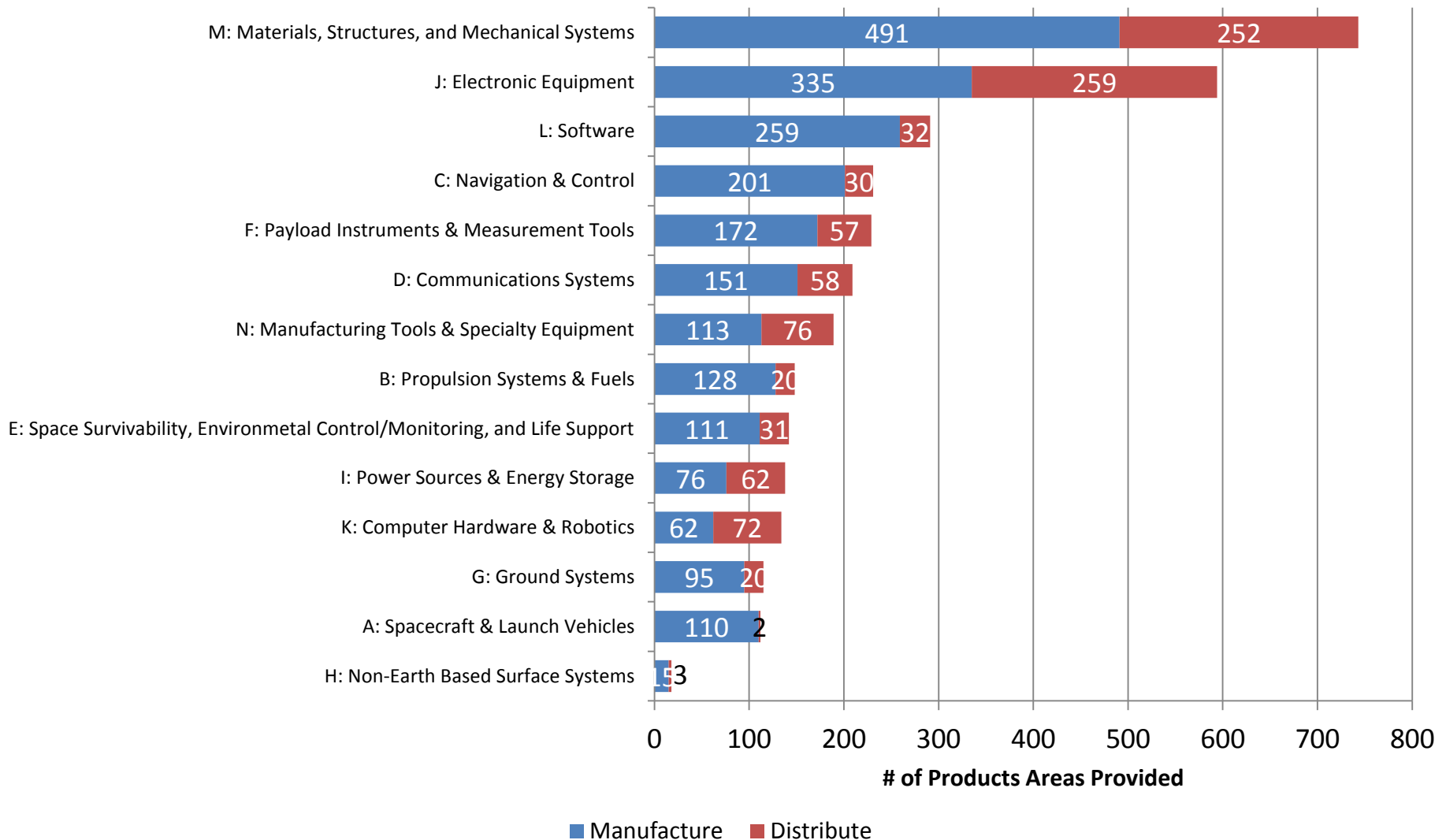
Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

## Products and Services Provided by Self-Identified Small Businesses\*

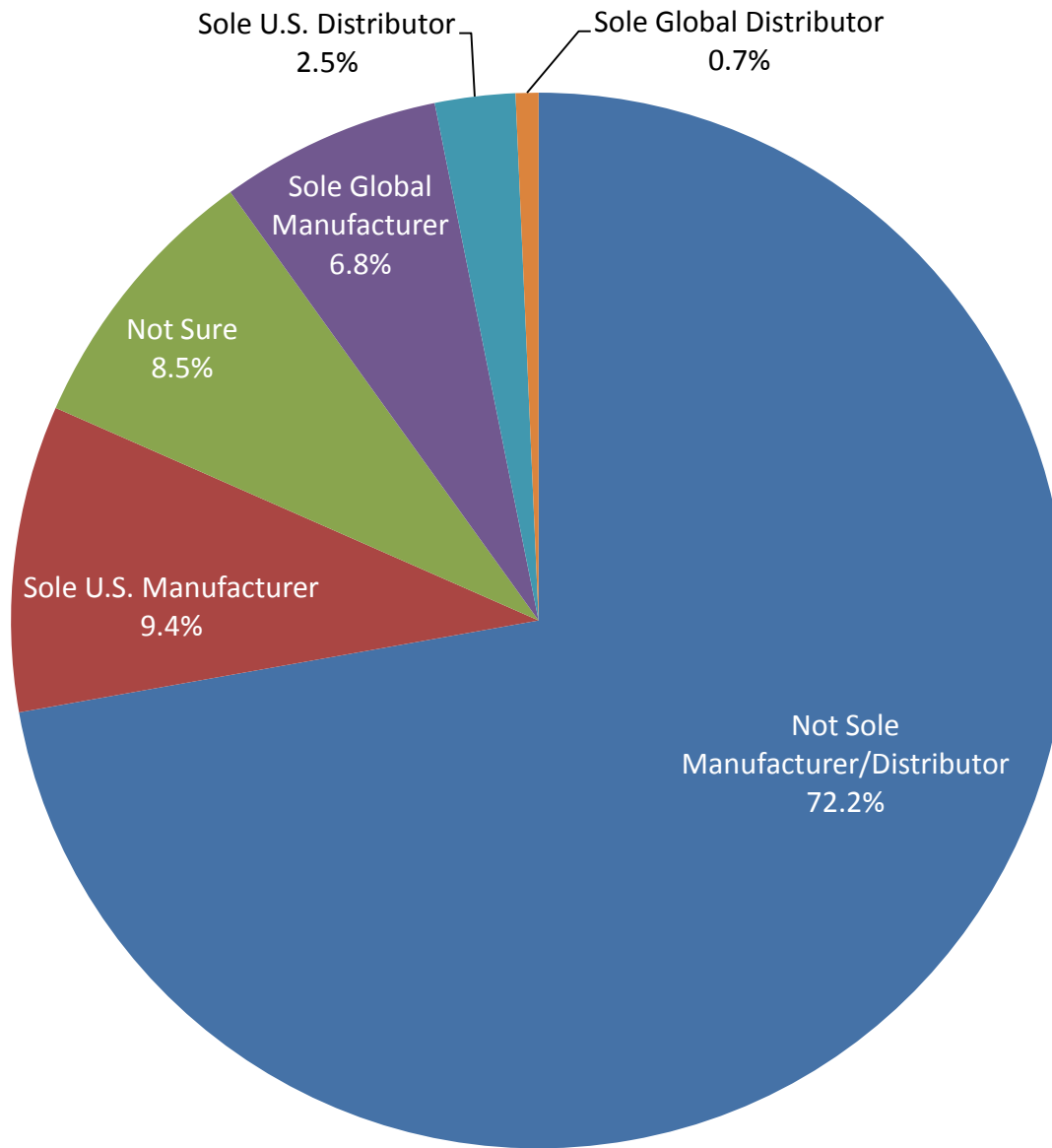


\* Based on 698 responses from self-identified small businesses. Includes all types of small businesses.

# Products Provided by Respondents – Manufacturing vs. Distribution



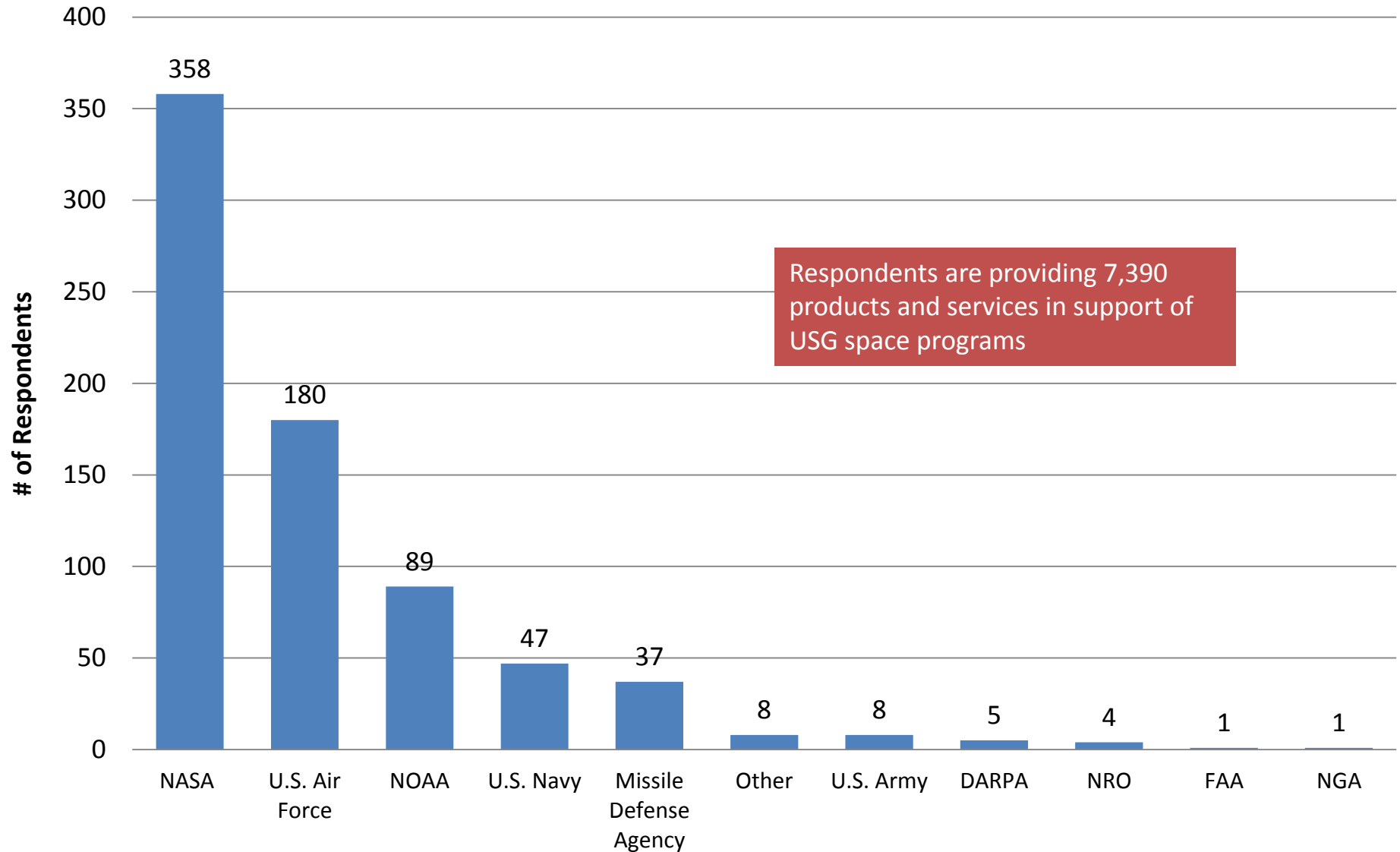
## Sole Manufacturers/Distributors of Products\*



\* Based on the total number of product areas identified by respondents.

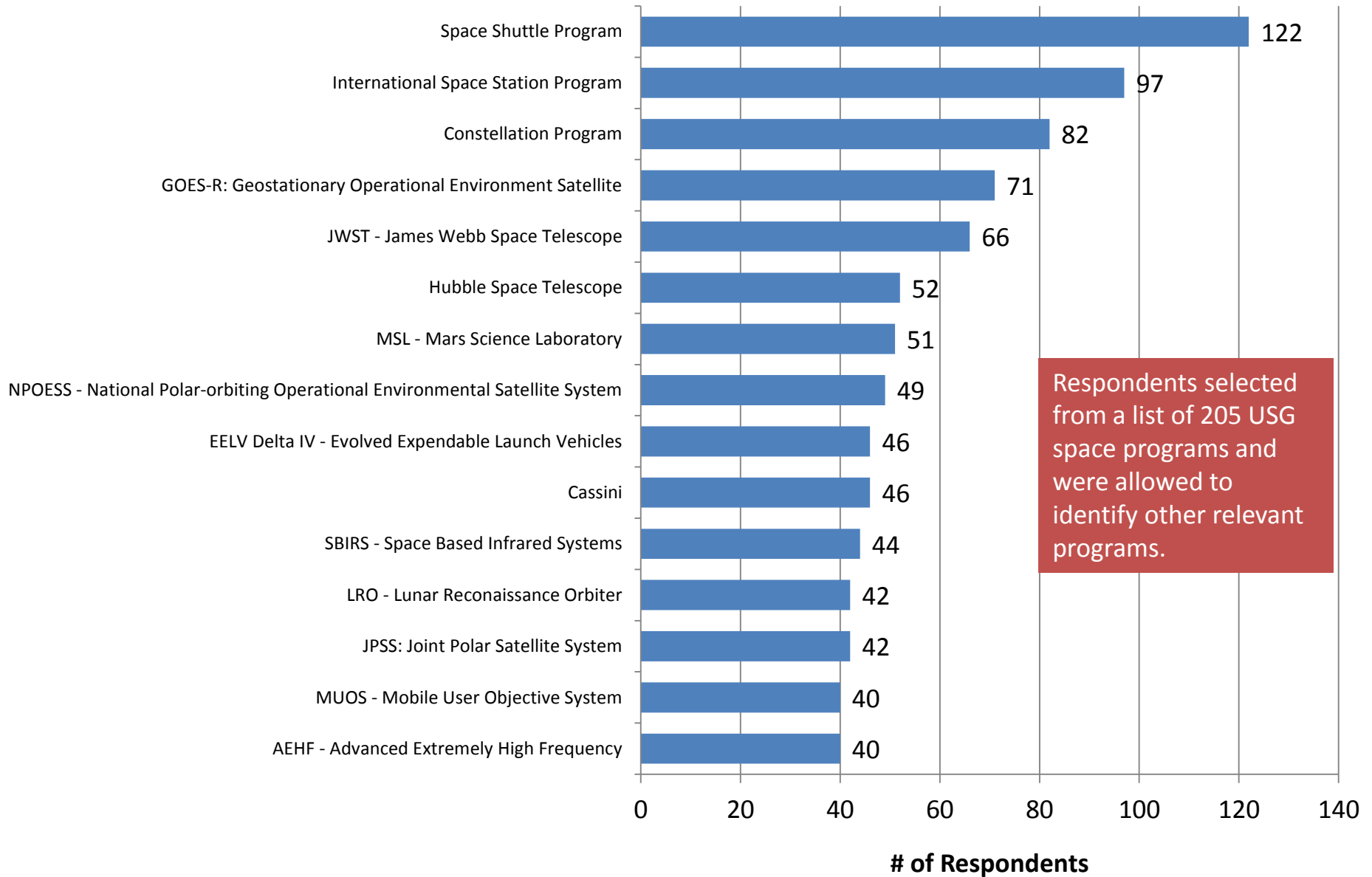
Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

## Support for Space Programs By USG Organization\*



\* Respondents identified direct support of a specific USG space program

# Support for USG Space Programs Based on Respondent Participation

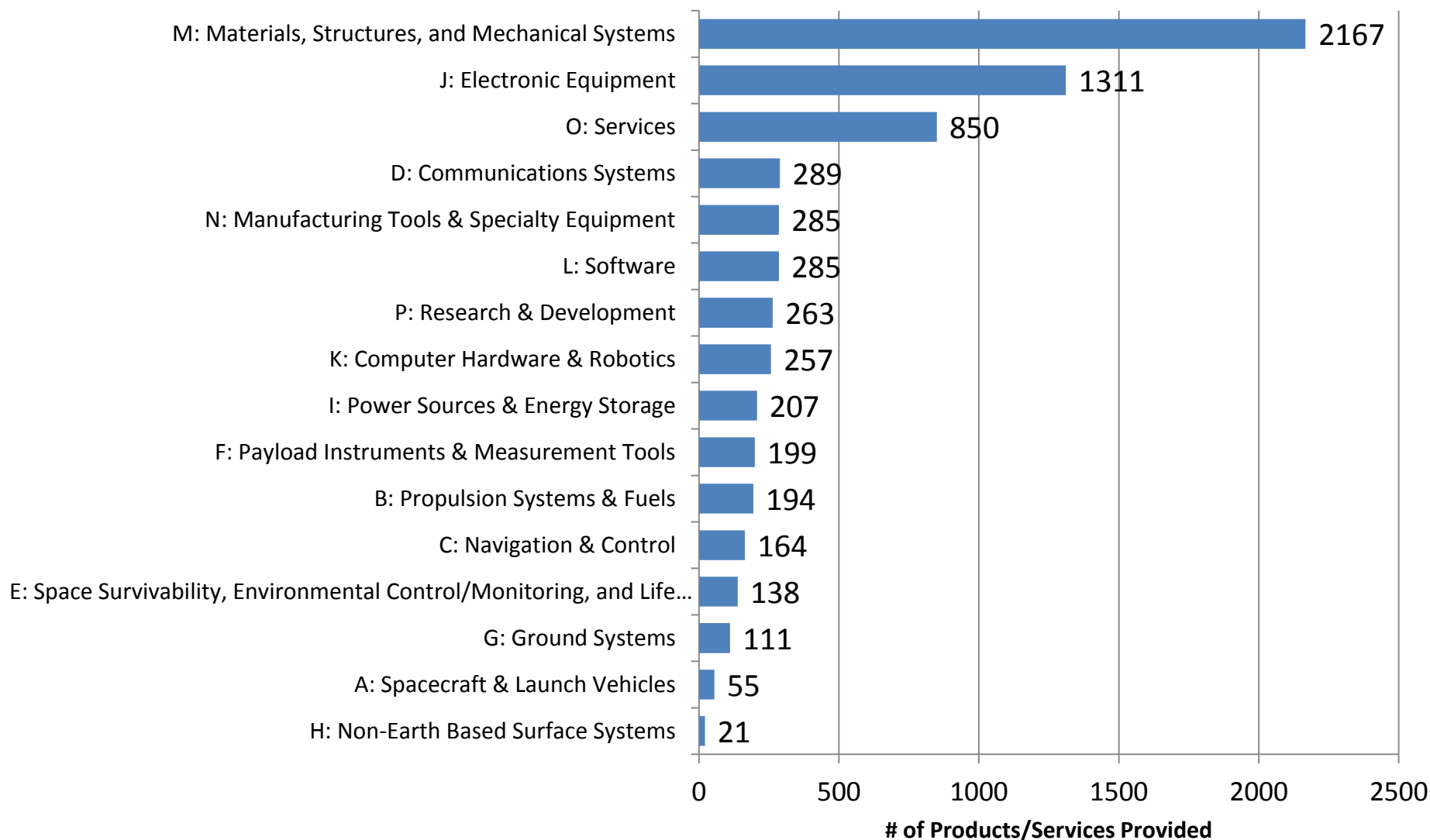


# Critical Suppliers

- Respondents identified 2,667 unique, critical suppliers that support items on the Product and Service List.
- These suppliers most commonly supported respondents with materials, structures, and mechanical systems, electronic equipment, and services.
- Fourteen percent of products and services provided to respondents were from sole source suppliers. Twenty-three percent of products and services were from single source suppliers.
- Respondents identified critical suppliers from 45 countries.
  - Based on the number of products and services provided, the most prominent non-U.S. suppliers were located in Japan, Canada, Germany, the United Kingdom, and China.
  - Non-U.S. suppliers most commonly provided respondents with materials, structures, and mechanical systems, electronic equipment, and communications systems.

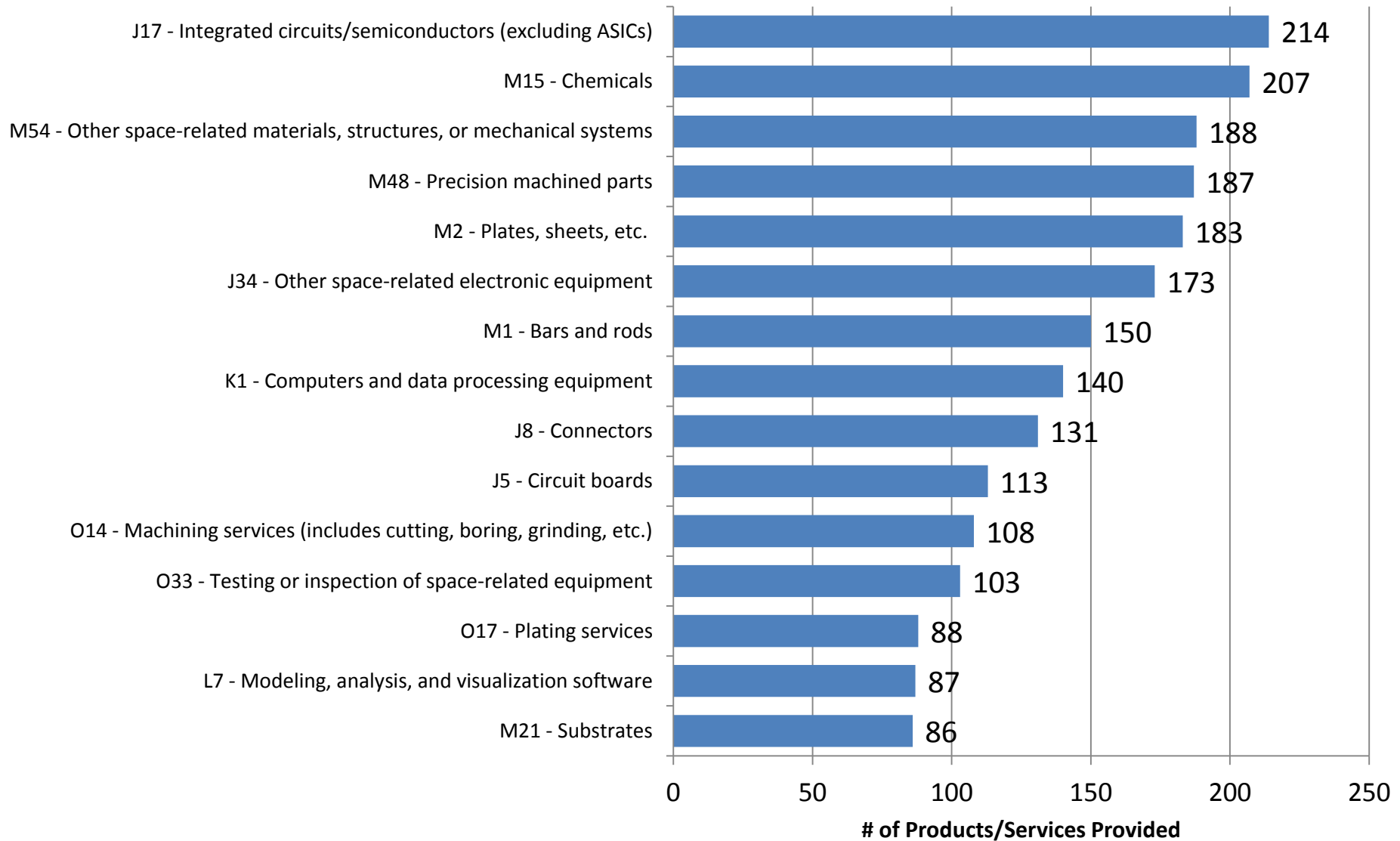
# Top Products and Services Provided by Suppliers

## – by Product and Service Segment

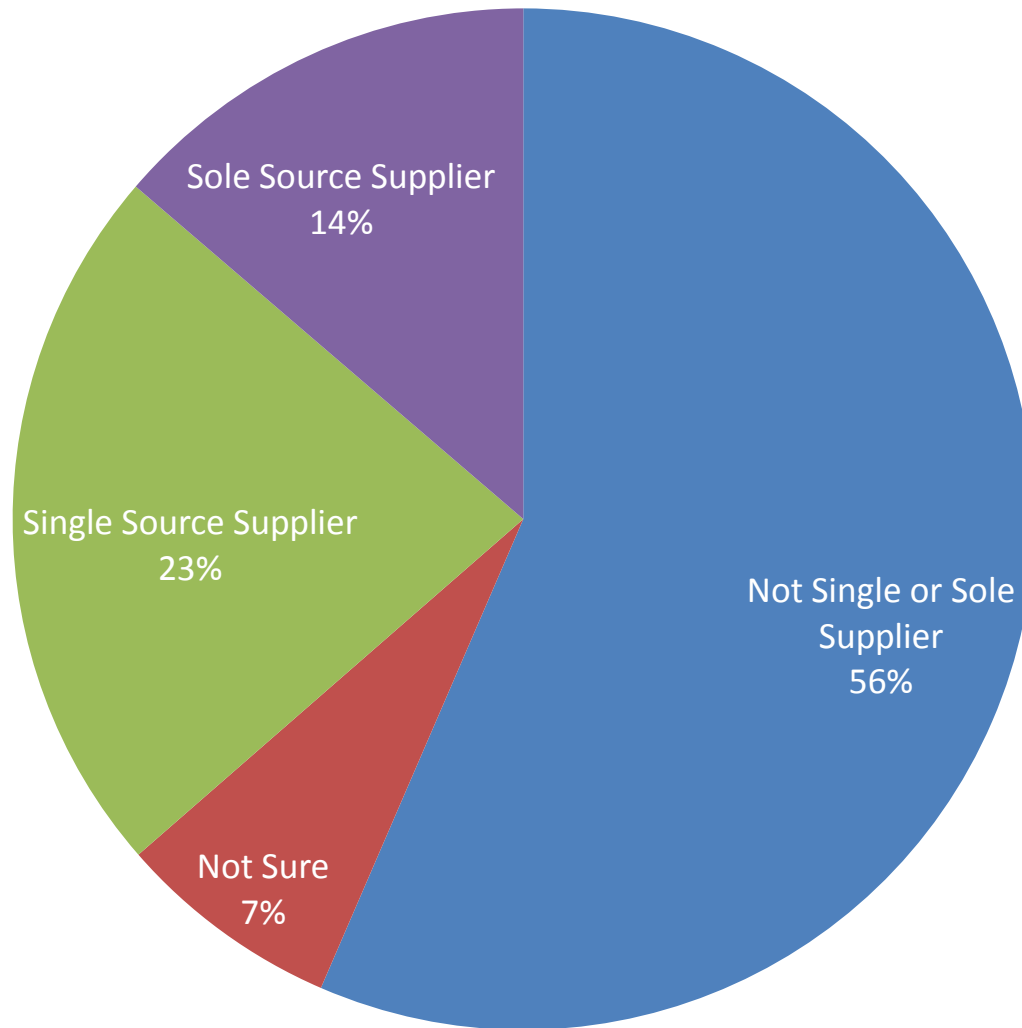




# Top 15 Product and Service Areas Provided by Suppliers

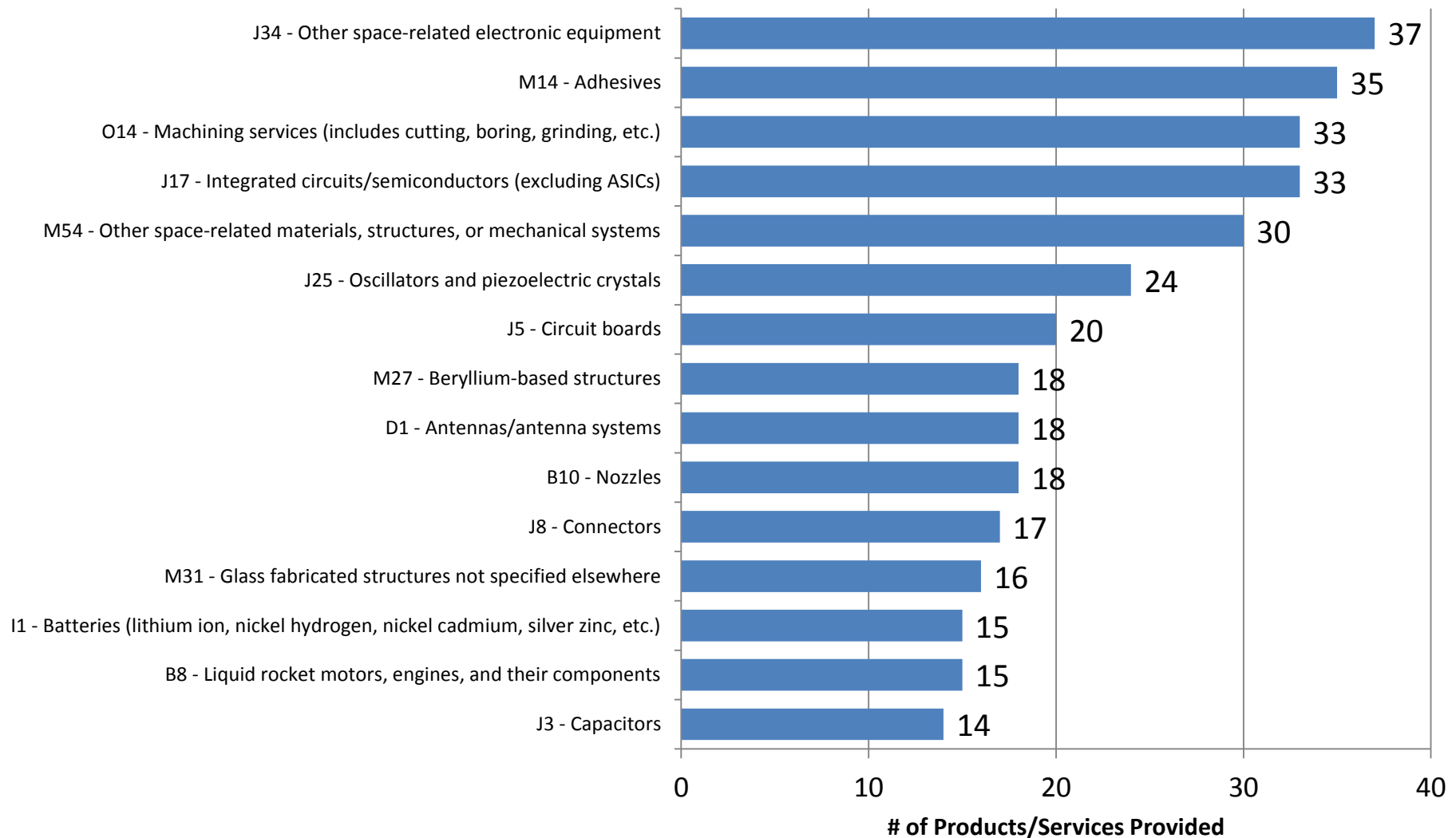


## Single and Sole Source Suppliers\*

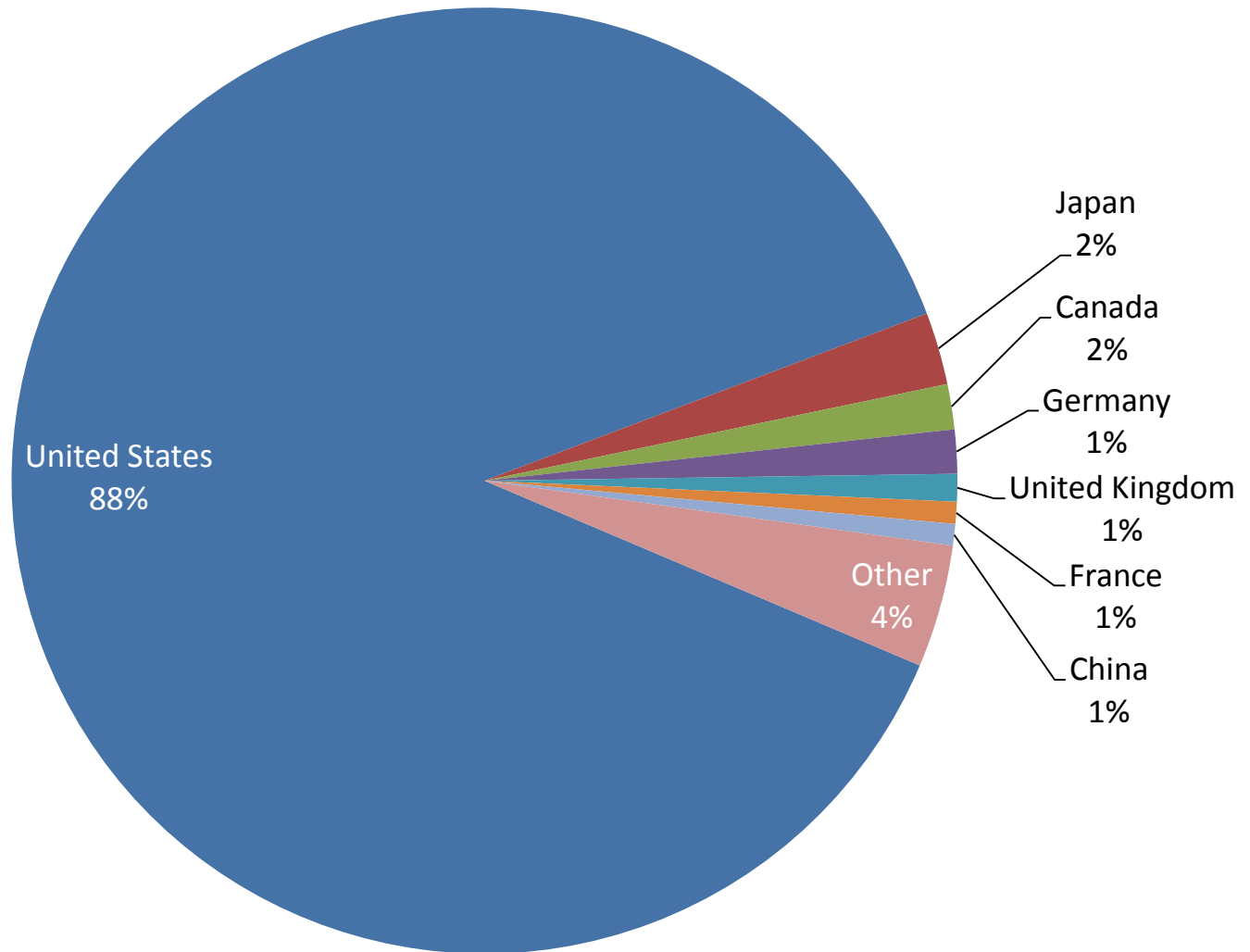


\* Based on the total number of products/services supplied

# Top 15 Product and Service Areas Provided by Sole Source Suppliers

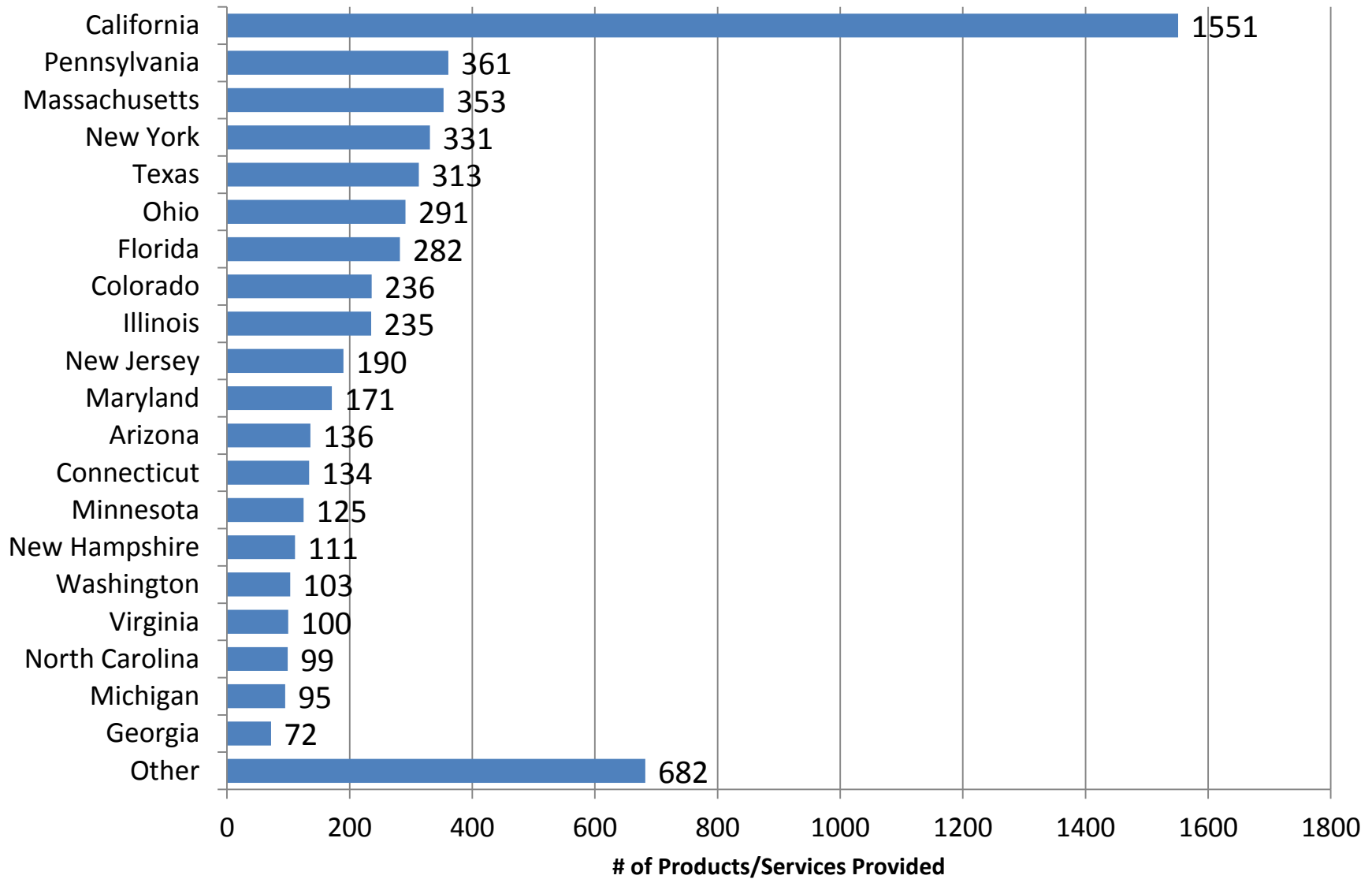


## Location of Suppliers by Country\*

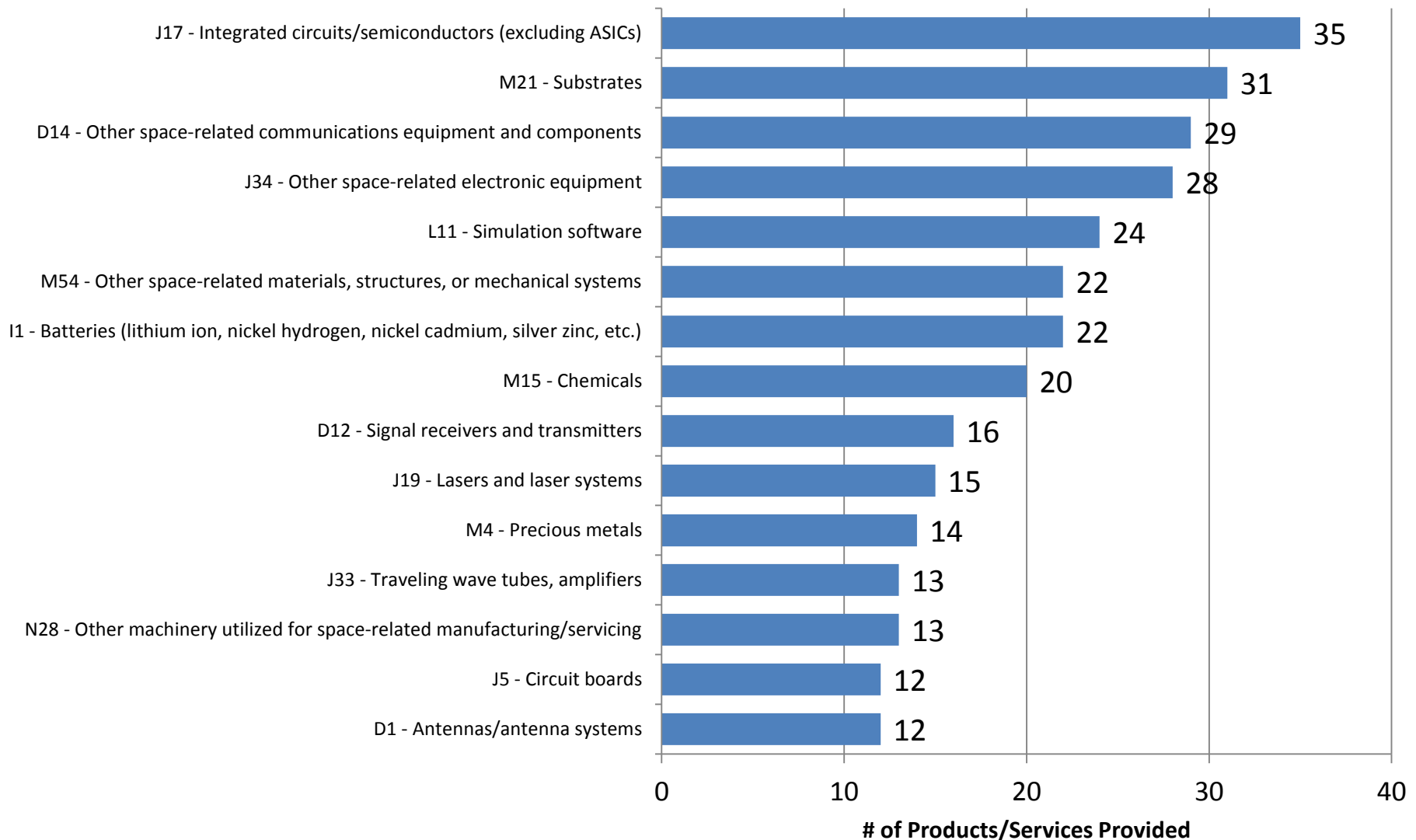


\* Based on the total number of products/services supplied

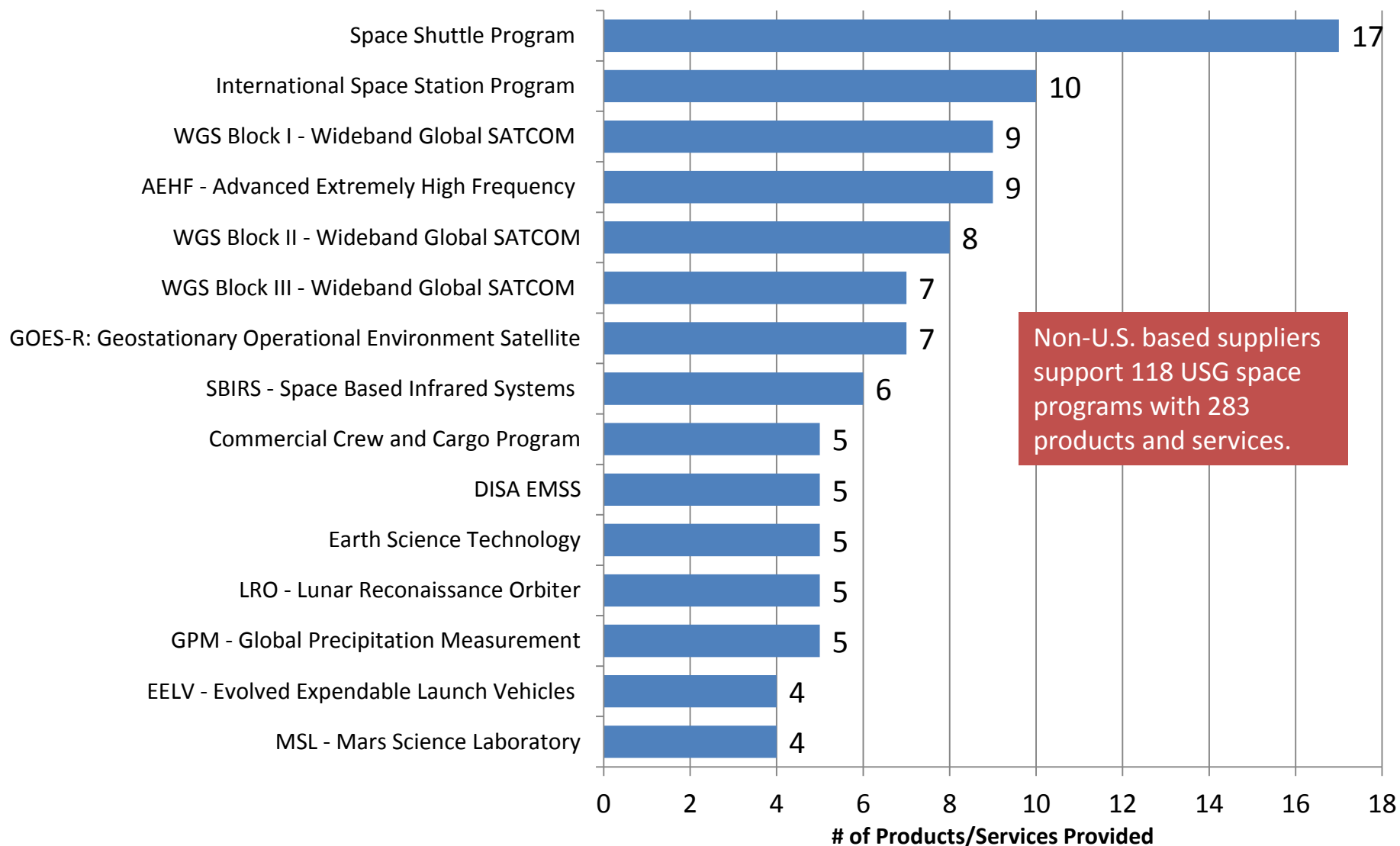
## State Location of U.S.-Based Suppliers



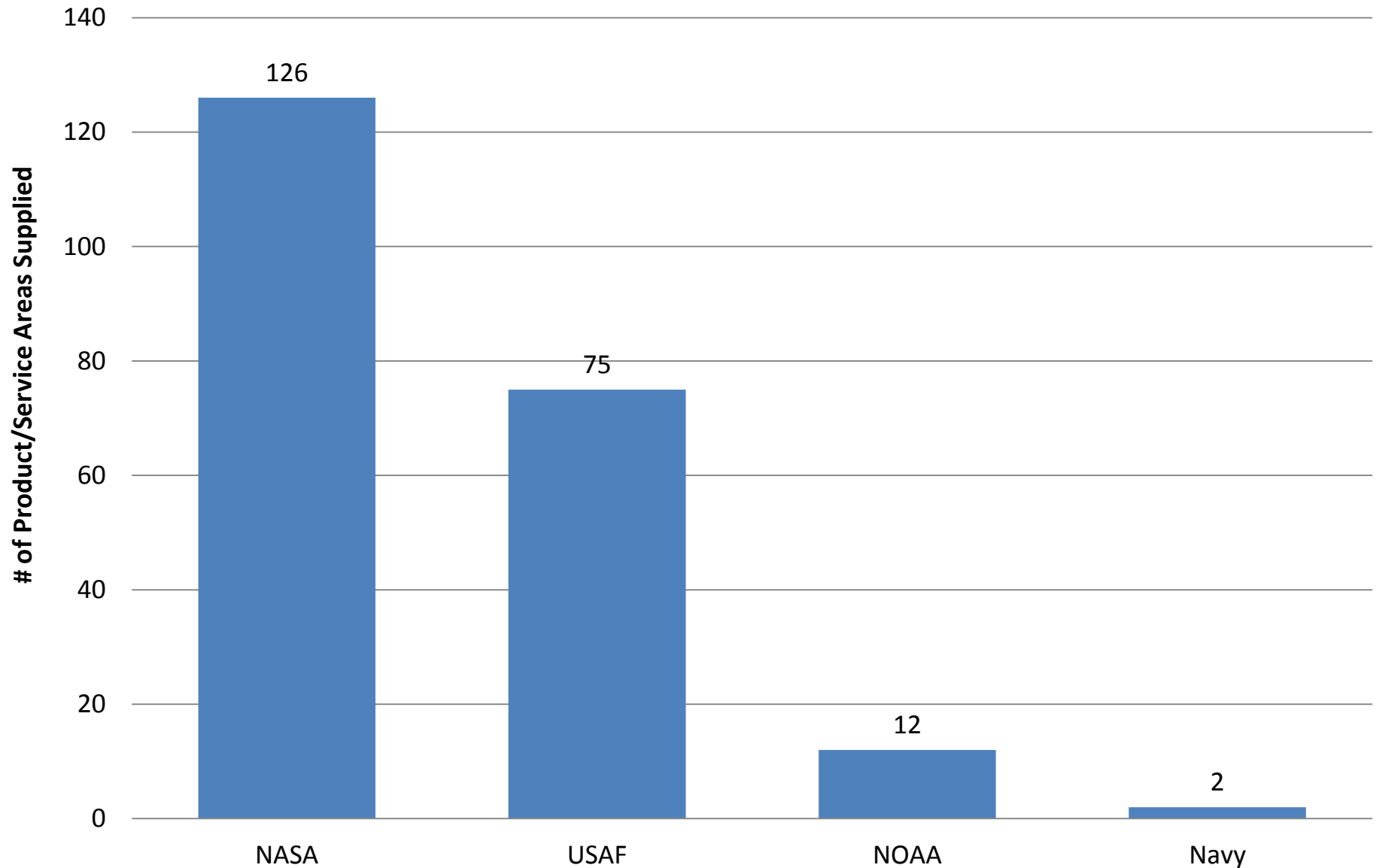
# Top 15 Product and Service Areas Provided by Non-U.S. Based Suppliers



## USG Space Programs with the Greatest Non-U.S. Based Supplier Support



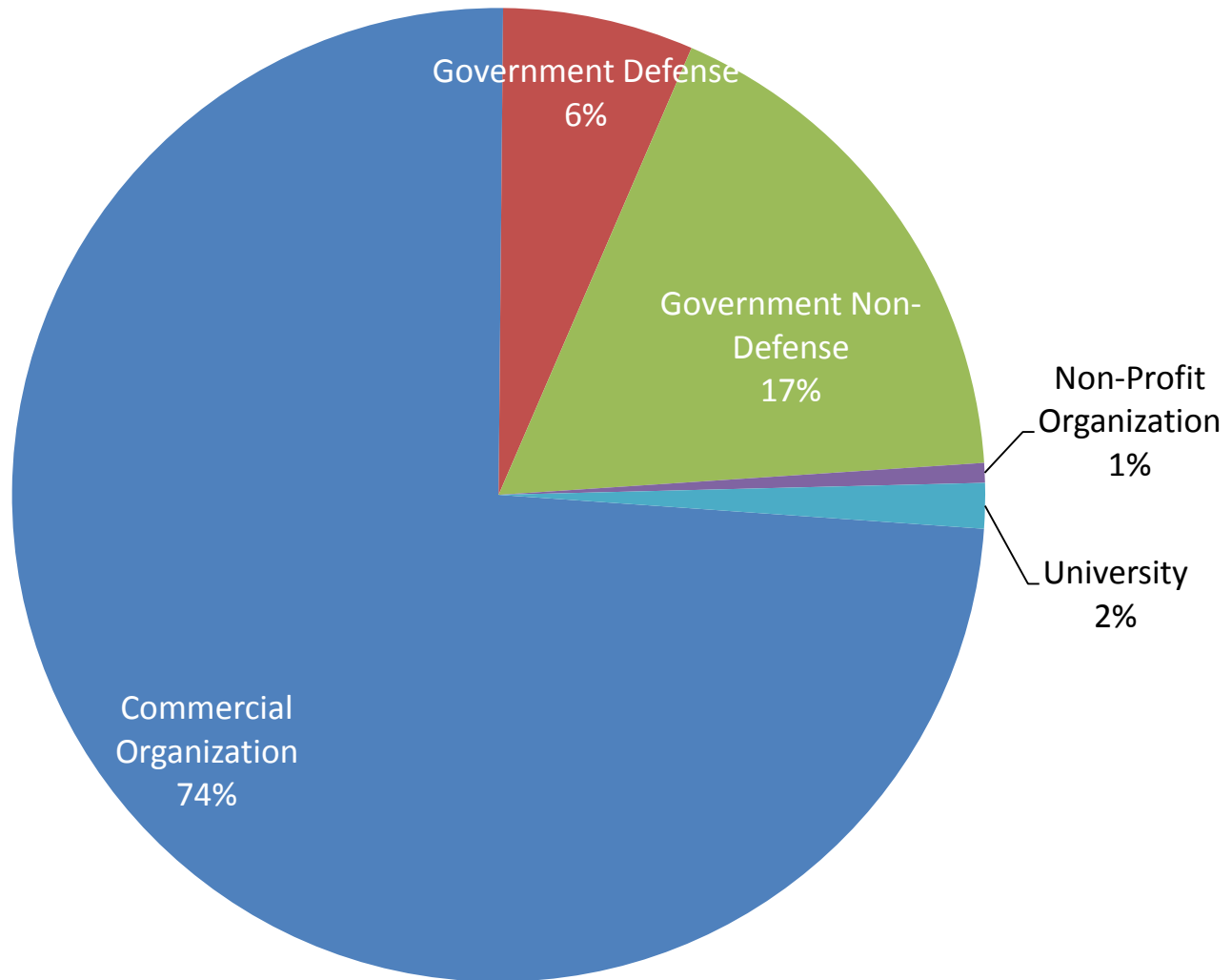
## Non-U.S. Supplier Support to USG Space Programs



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

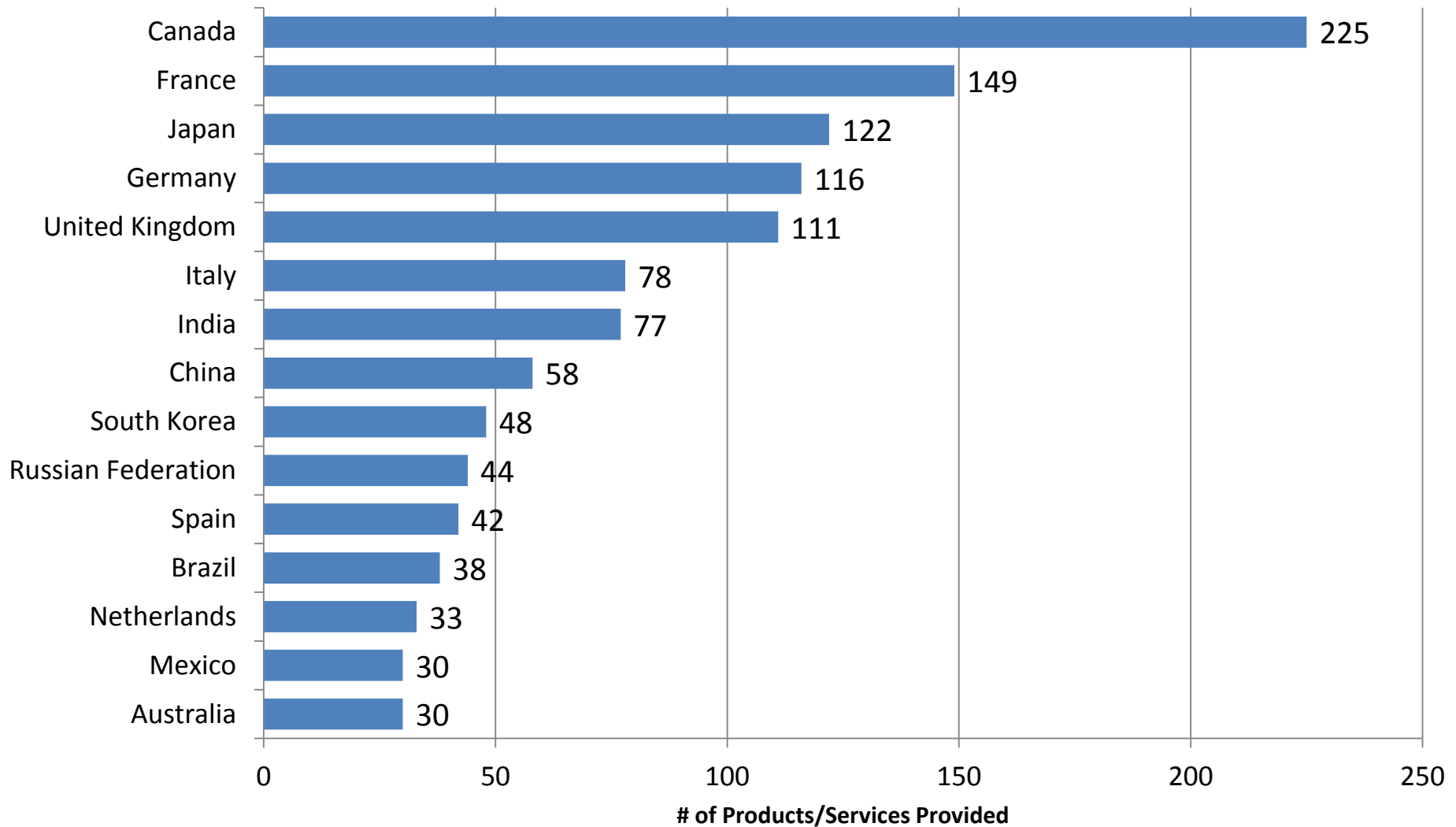


## Type of Non-U.S. Based, Space-Related Customers\*



\* Based on the total number of products/services supplied

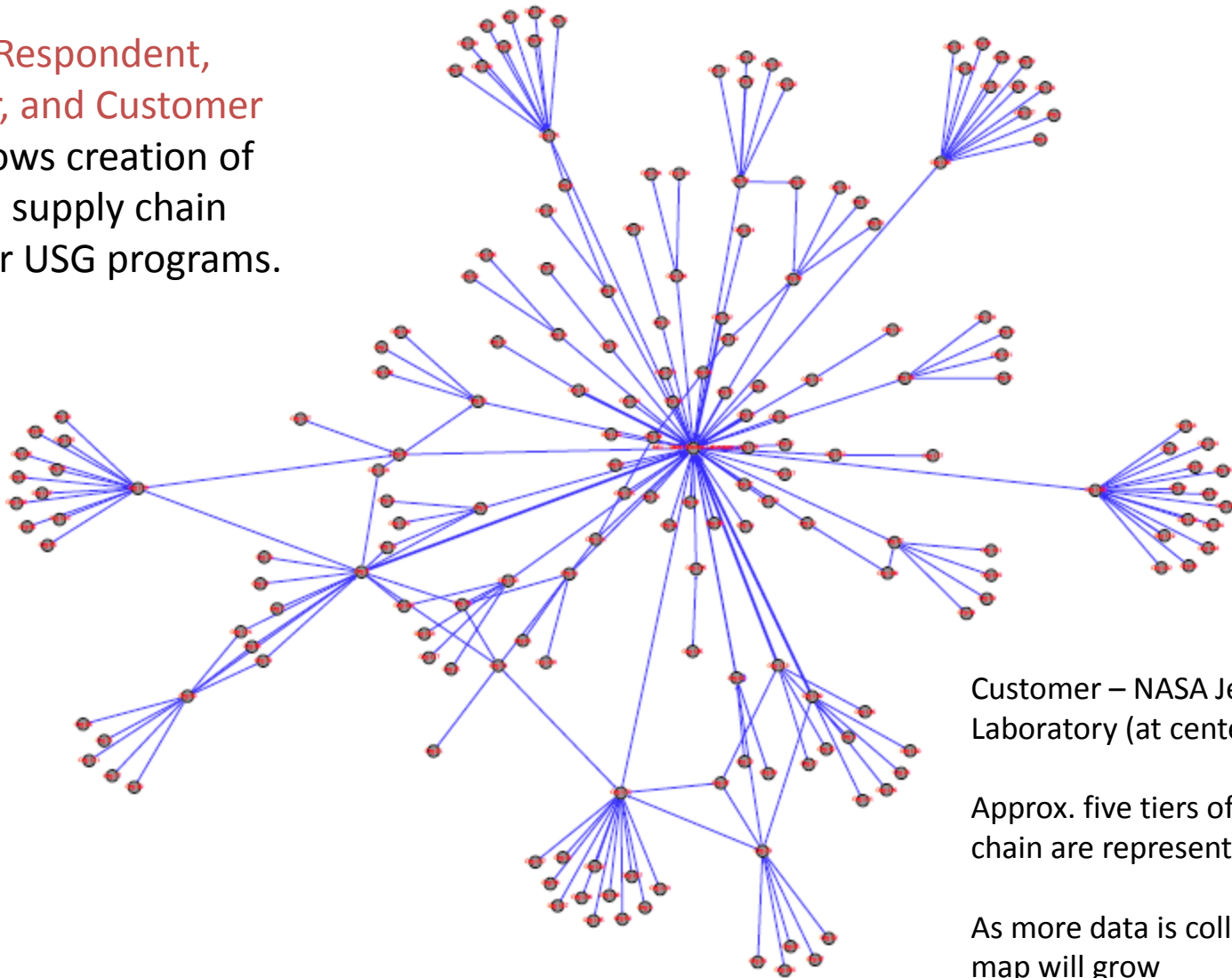
## Top 15 Locations of Non-U.S. Based, Space-Related Customers\*



\* Based on the total number of products/services supplied

## Utilizing the Data: Supply Chain Mapping Mars Science Laboratory (MSL) Curiosity Rover

Linking **Respondent**,  
**Supplier**, and **Customer**  
data allows creation of  
detailed supply chain  
maps for USG programs.



Customer – NASA Jet Propulsion  
Laboratory (at center)

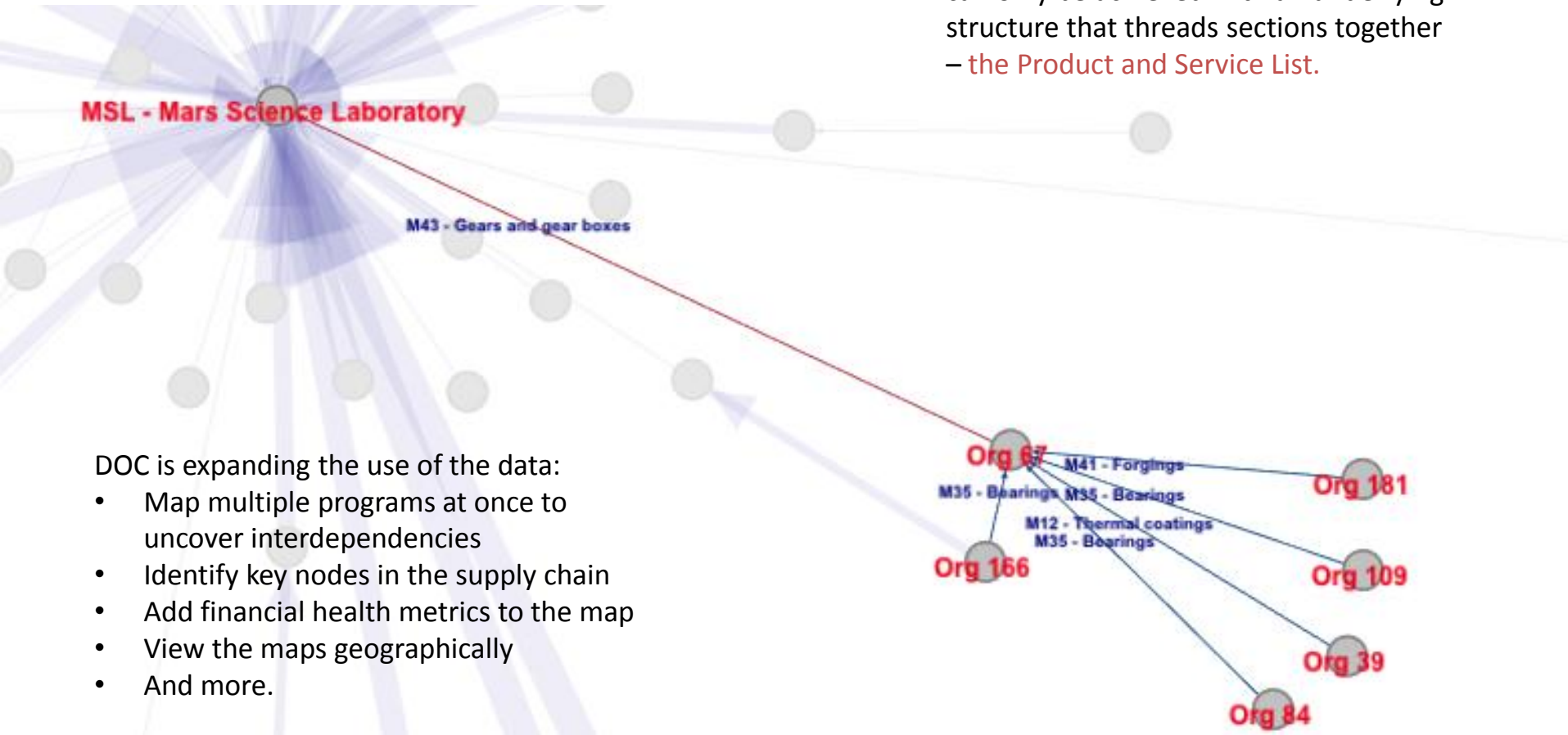
Approx. five tiers of the supply  
chain are represented

As more data is collected, the  
map will grow

# Mars Science Laboratory (MSL) Curiosity Rover

## - Detailed View

This level of detail in supply chain mapping can only be achieved with an underlying structure that threads sections together – the **Product and Service List**.

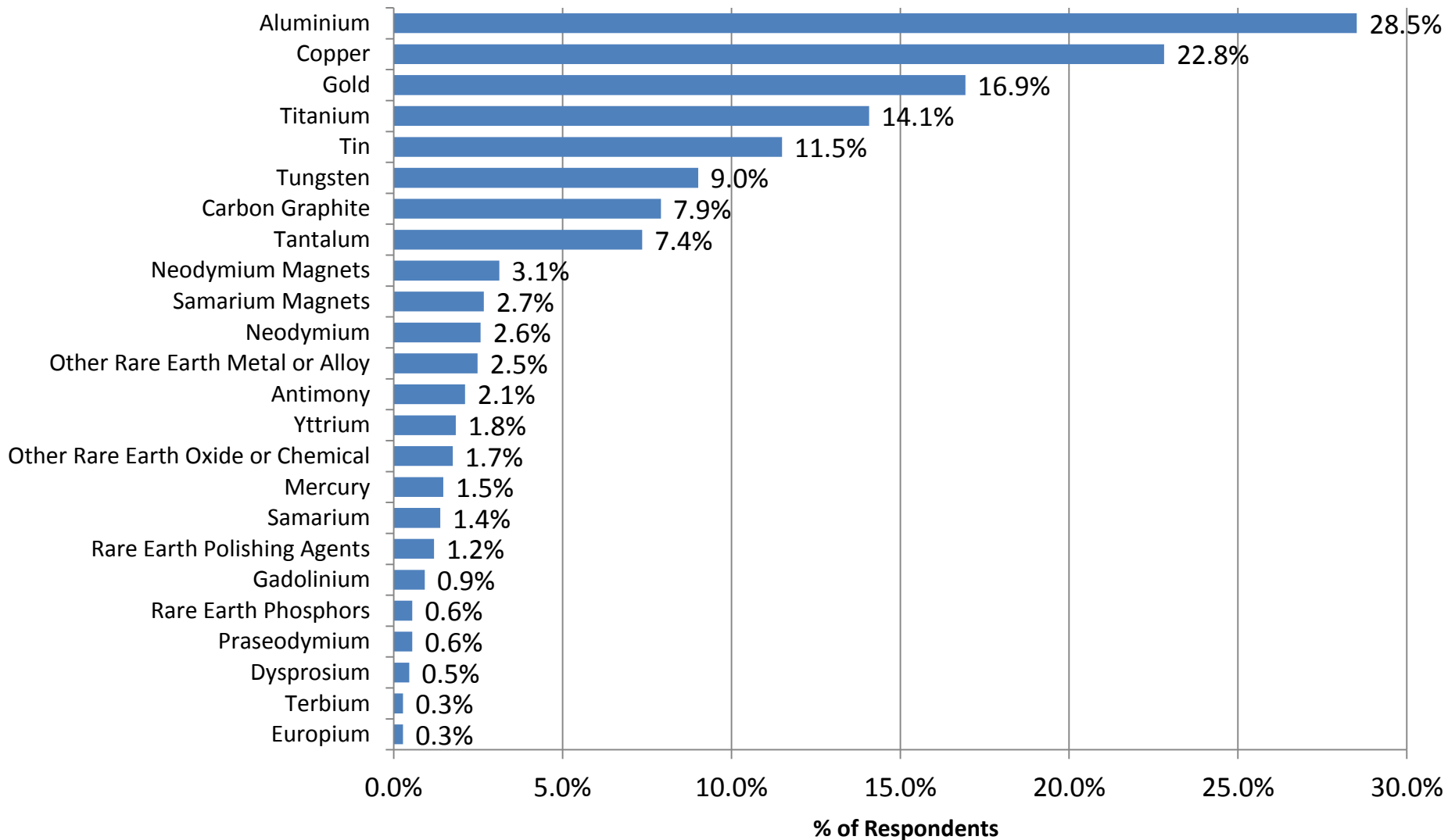


DOC is expanding the use of the data:

- Map multiple programs at once to uncover interdependencies
- Identify key nodes in the supply chain
- Add financial health metrics to the map
- View the maps geographically
- And more.

Partner organizations can tailor these maps to their specific needs.

# Use of Rare Earth and Other Elements for Space-Related Production Processes or Final Products\*



\* Based on 1,087 total respondents.

## Space-Related Operations Adversely Impacted by Issues with Rare Earth or Other Elements

Issue	Percentage of Respondents
Sharp Changes in Market Price	22.4%
Decrease in U.S. Availability	10.8%
Increased U.S. Demand	7.7%
Increased in Non-U.S. Demand	7.0%
Decrease in non-U.S. Availability	4.8%
Other	2.4%

\* As a percentage of 415 respondents utilizing at least one of the elements identified in the survey

# Adverse Impacts on Space-Related Operations due to Issues with Rare Earth or Other Elements

- “Wild swings in rare earth oxides and metals (samarium, neodymium, dysprosium), impacting pricing and availability of magnets and alloy. This is causing some customers to look to buy these direct from China to save on cost although in most cases this likely conflicts with export rules. Some customers have thought about designing rare earth magnets out, but there is not a substitute in most cases.” – Large company
- “Prices for rare earth oxides are 5 to 10 times higher than 2 years ago due to limited domestic supply and Chinese export restrictions and taxes.” – Very small company
- “As materials are harder to come by and due to government and environmental restrictions, including restrictions on storing, vendors stop making parts; some raw materials are bought outside of US resulting in higher prices and longer lead times. There are also may be no suppliers left in the US that makes the raw materials that are needed. “ – Very small company
- “Carbon Graphite availability due to Airbus A350/A380 demands.” – Large company

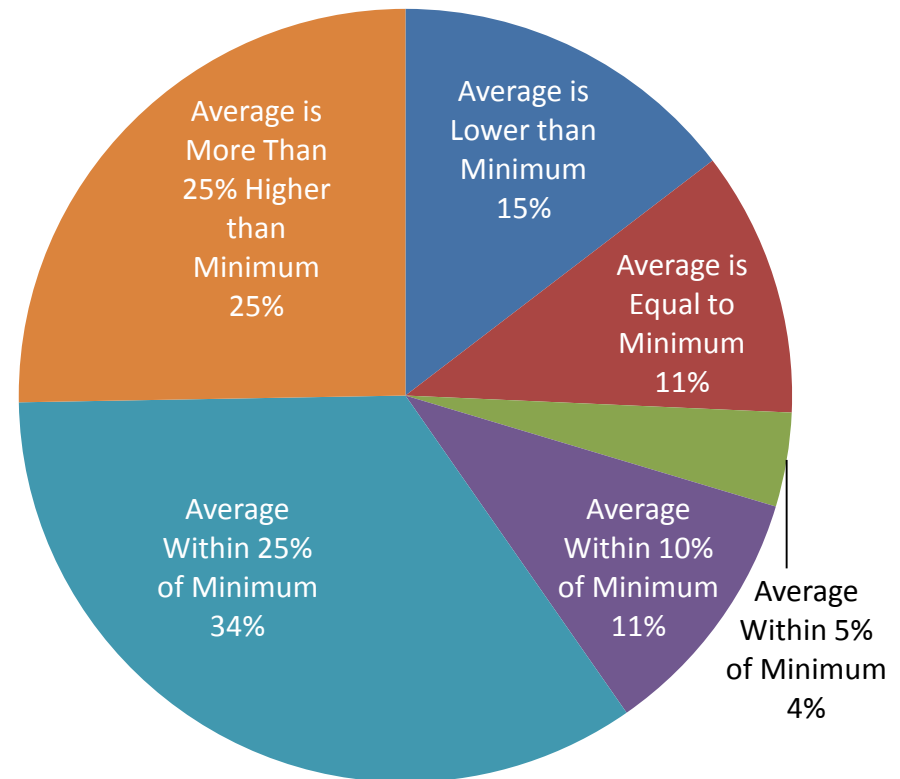
# Manufacturing Capacity Utilization Rates

Respondents were asked to provide:

- a) Their manufacturing capacity utilization rates for 2009-2012; and
- b) An estimate of the minimum level capacity utilization to keep production costs from changing disproportionately to order volume.

**How close are these respondents to these identified minimum levels?**

**Proximity of Average Capacity Utilization Rate to Stated Minimum Utilization Rate**





# Most Challenging Type of Outside Support Operations

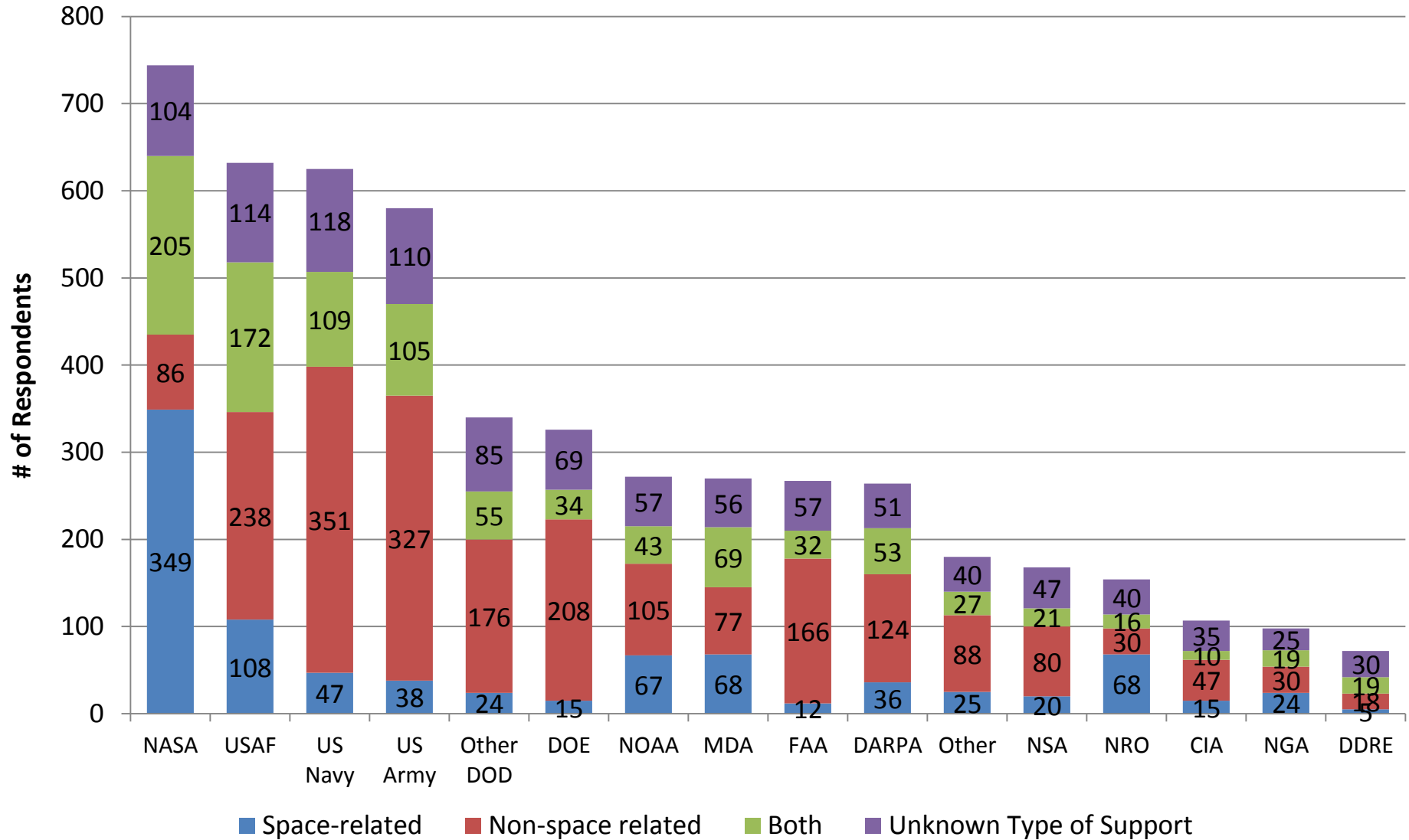


# Encounters with Counterfeits

- From 2009-2012, 90 respondents encountered counterfeits in some form.
  - Of these, 48 respondents do not have a formal, written protocol for handling, documenting, and reporting incidents of counterfeits.
- Overall, **78 percent** of respondents do not have a formal protocol for handling counterfeits.
- 70 percent of respondents involved in manufacturing (including assembly) do not have a formal protocol for handling counterfeits.

Type of Counterfeits	# of Respondents
Electronics	52
Materials (metals, alloys, elements, etc.)	14
Other types of Counterfeits	9
Software	8
Power source or energy storage equipment	6
Testing procedures and/or documentation	6
Fasteners	5
Mechanical systems (hydraulics, gear boxes, etc.)	3
Systems/sub-systems (navigation, communication, propulsion, etc.)	2

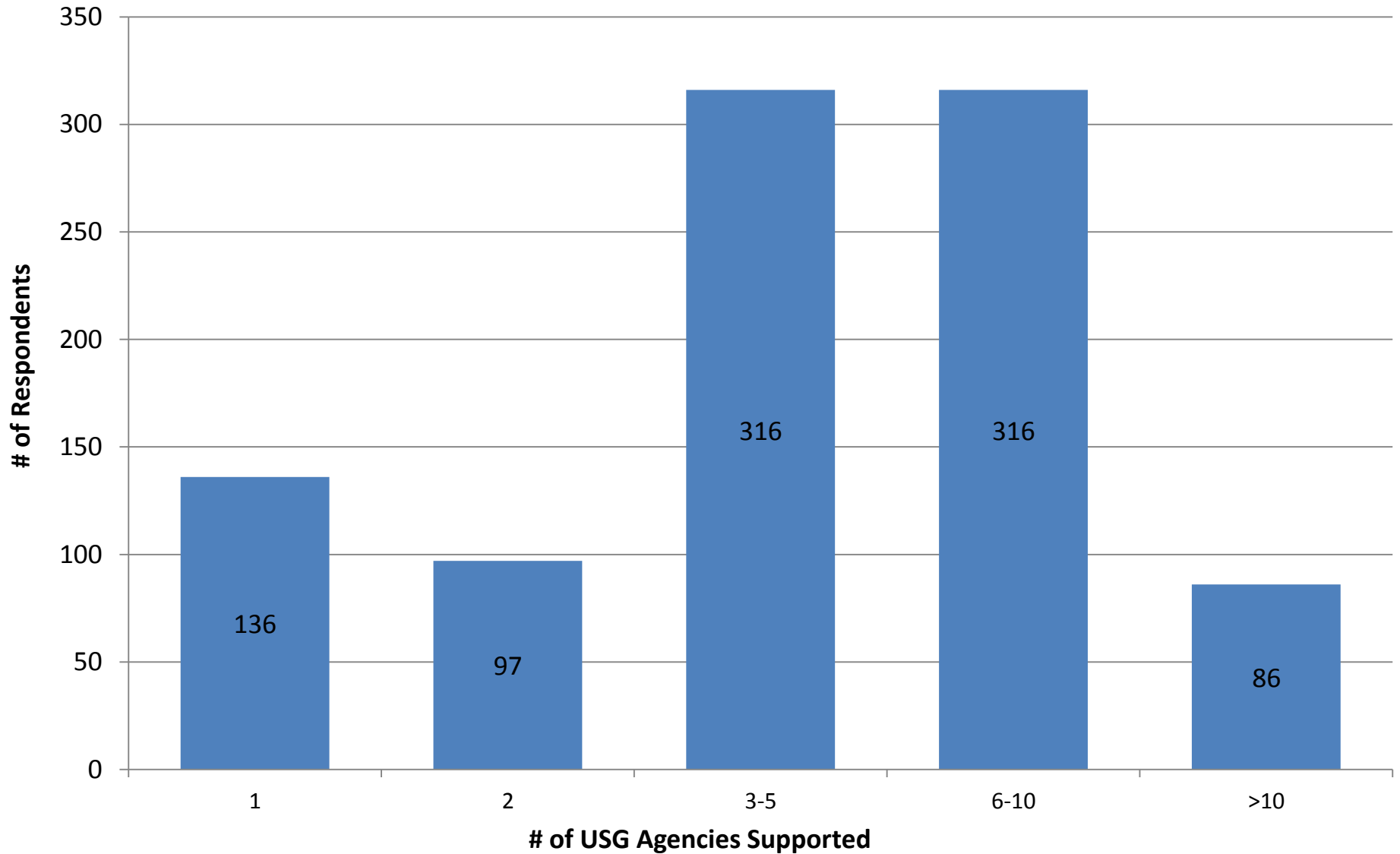
## Support for USG Agencies\*



\* This identification of support is not tied to a specific USG program.

Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

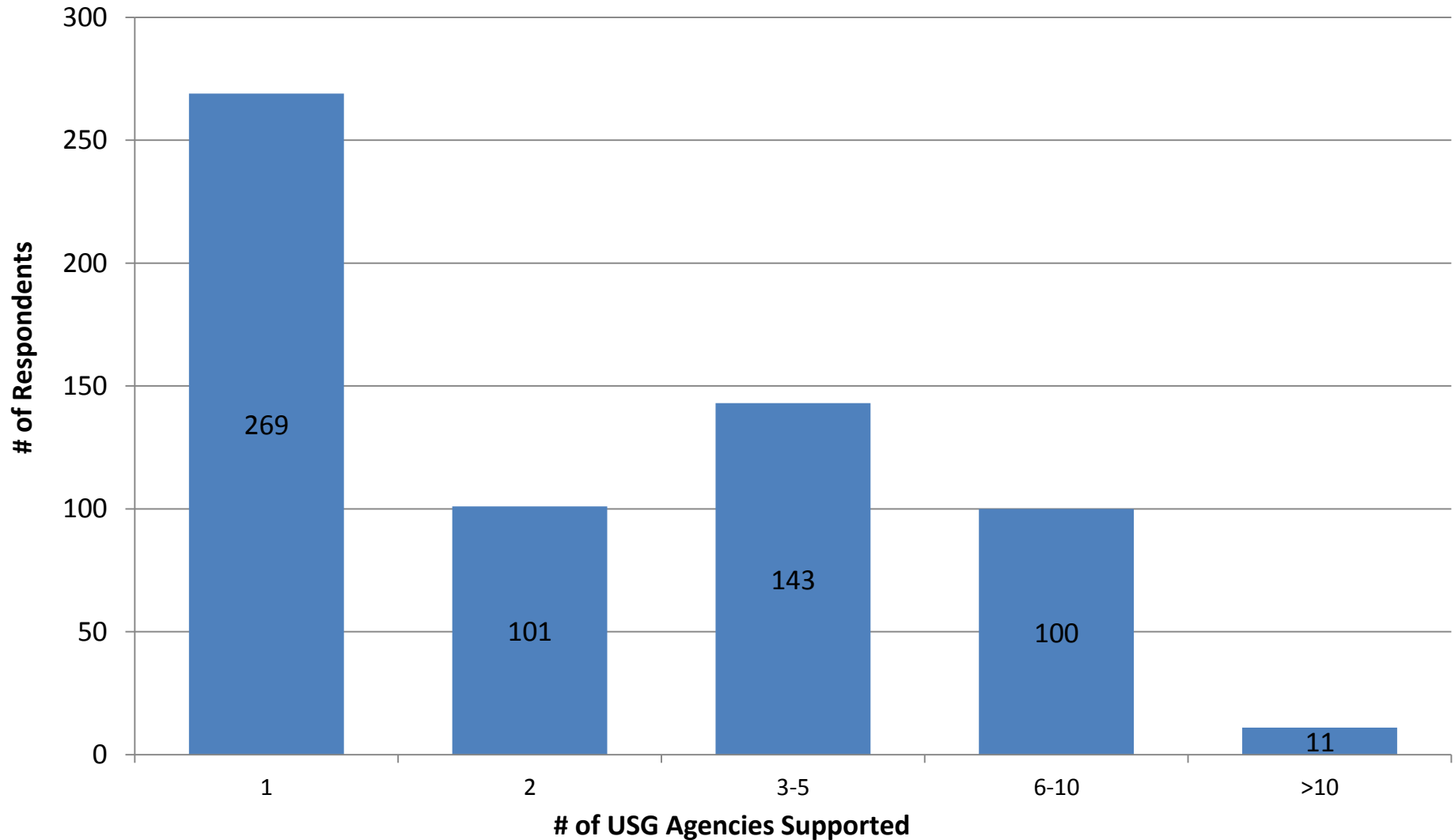
## Respondents Supporting Multiple USG Agencies\*



\* Based on any type of support.

Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

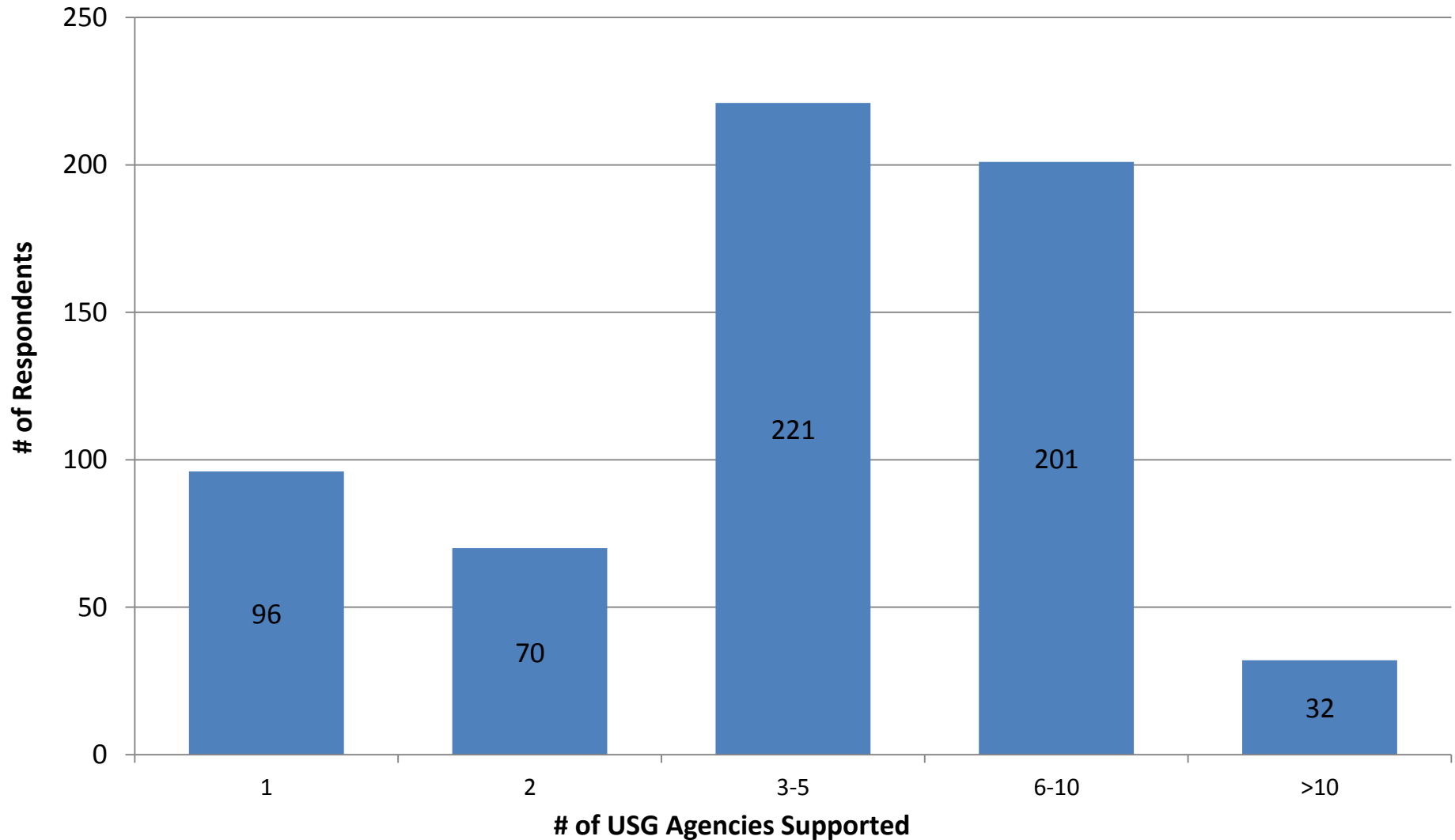
## Respondents Providing Space-Related Support to Multiple USG Agencies\*



\* A combination of "space-related" support and "both" responses.

Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

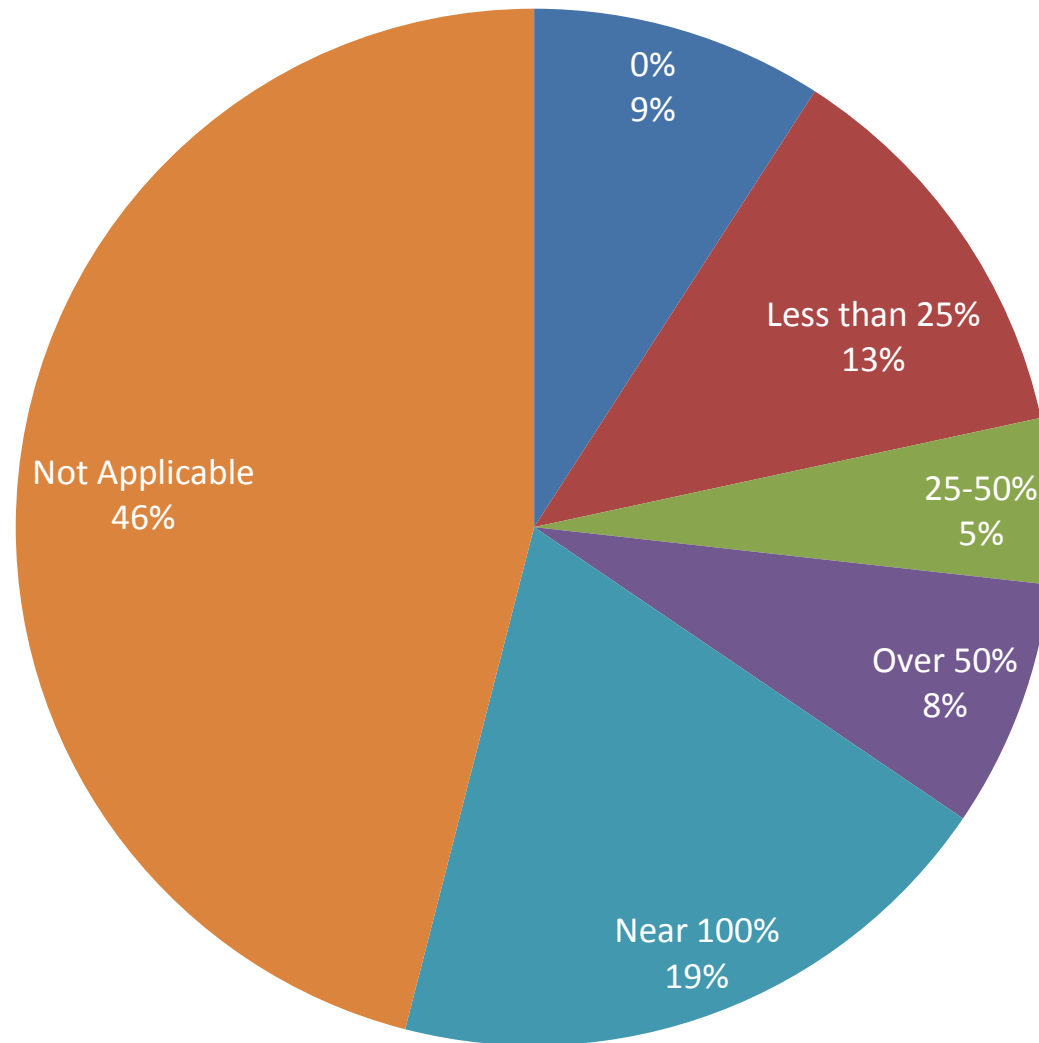
## Self-Identified Small Businesses Supporting Multiple USG Agencies\*



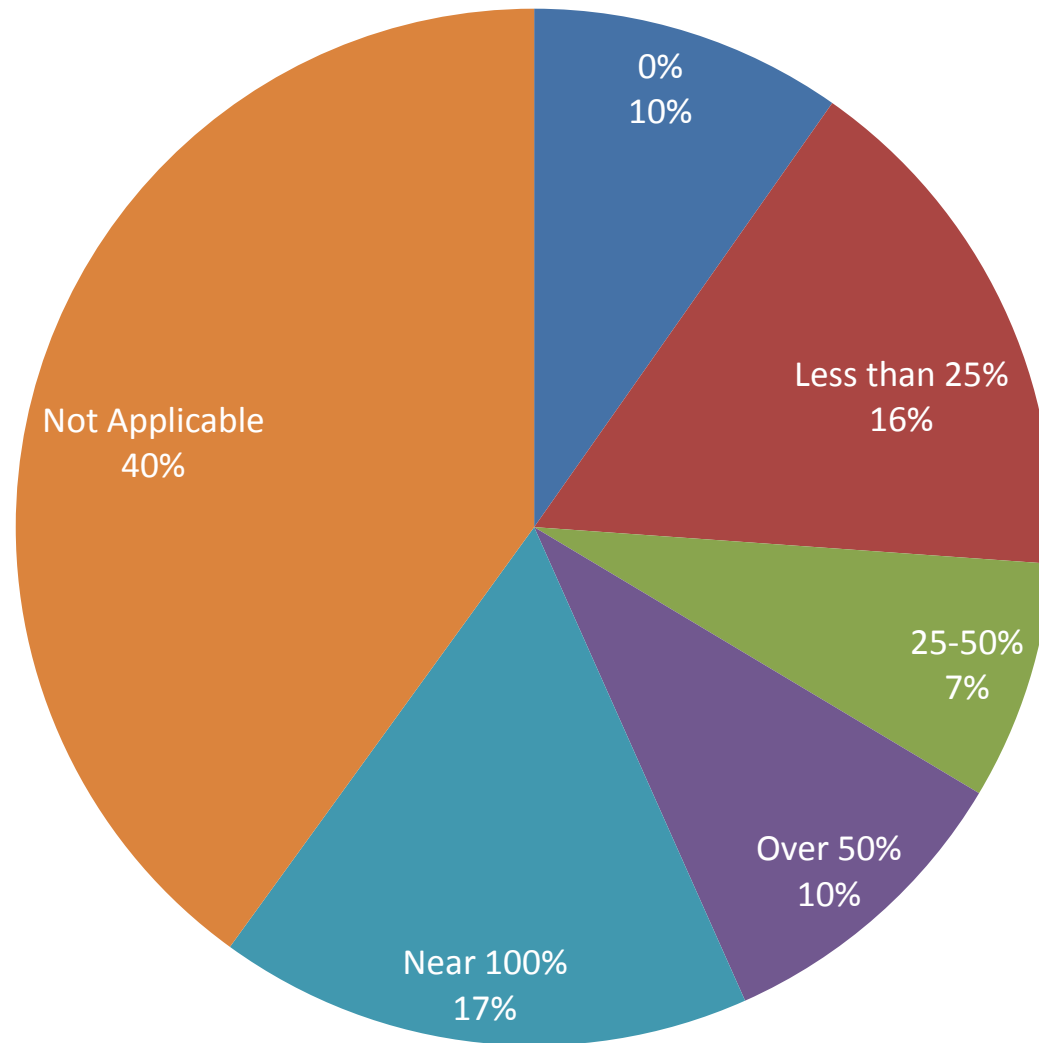
\* Based on any type of support.

Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

# Compatibility of USG Space-Related Products/Services with Commercial Space-Related Products/Services



## Compatibility of Respondents' Space-Related Products/Services with Non-Space related Products/Services

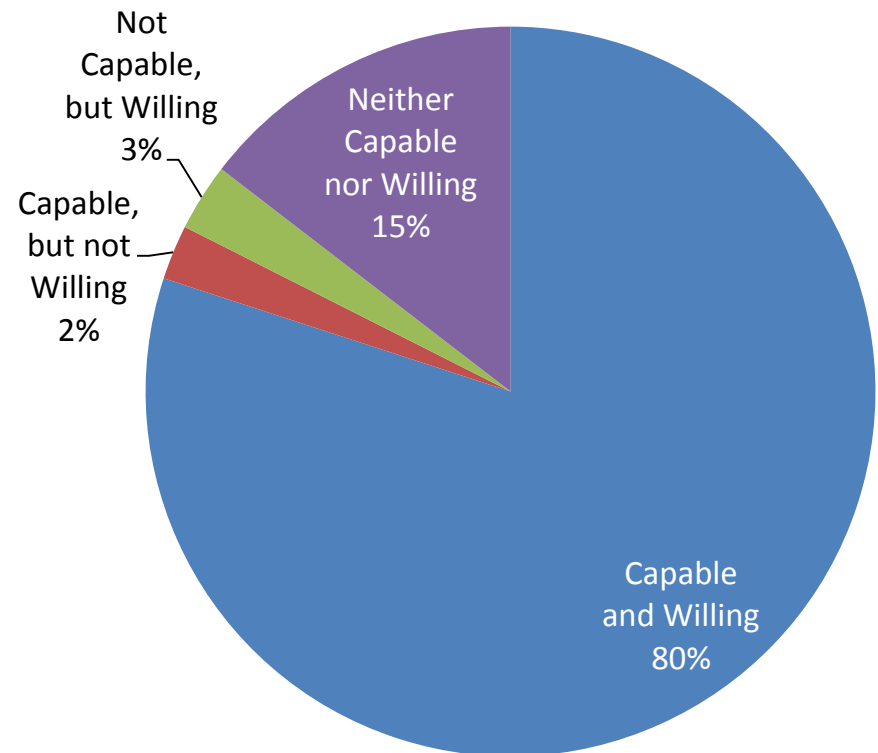




## Respondents' Willingness and Capability to Provide Specialty, Low-Volume or One-Time, Space-Related Products/Services to the USG

### Themes:

- **Contracting**
  - Quicker and cleaner
  - More direct (less use of primes)
- **Variability of Funding**
  - Consistency
  - Better communication of strategic planning
  - Demand forecasting
- **Broader Customer Base**
  - Relax U.S. export controls



# Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

## Theme: Contracting

- “Almost 100% of our space related sales are custom designed and manufactured equipment for space simulation (thermal chambers). It would help us if contracts required more evidence of previous success because we've lost contracts to suppliers who bid lower than we did because they had never made similar systems and had no idea of the work that was involved.” - Very small company
- “...The government contracting mechanism was vastly more efficient and easier to understand then that provided by the subcontract management company. Why not further simplify such contracts to make it even easier for small businesses, and let NASA directly contract as often as possible?” – Very small company
- “DARPA has a cyber fast-track program that can make a decision and put small businesses on contract within 2 weeks of receipt of proposal. If the space-related government did that, we could give them more responsive service.” - Very small company
- “Although unlikely, directly contact us about opportunities. Our organization does not have time available to try to navigate the complicated bidding process.”- Very small company
- “Please do not waste my time or my team's time...and contract directly with the company instead of using a contractor. The bullying tactics being used and the hundreds of hours of time wasting busywork they require has led to several no-bid responses to contracts that only [we] could perform. Last year, I spent TEN MONTHS negotiating with one of the large prime contractors for ONE instrument sale. Their terms were completely unacceptable. In contrast, the same type of sale to an export customer took less than two weeks, the contract was 4 pages long (instead of 27!) and was in two languages...I have had our government prime contractors take more than 6 months to pay on services contracts where I had been paying employees for the hours worked under that contract. I've been told from other small business owners that this has become the norm. -No thank you.” – Very small company

# Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

## Theme: Variability of Funding

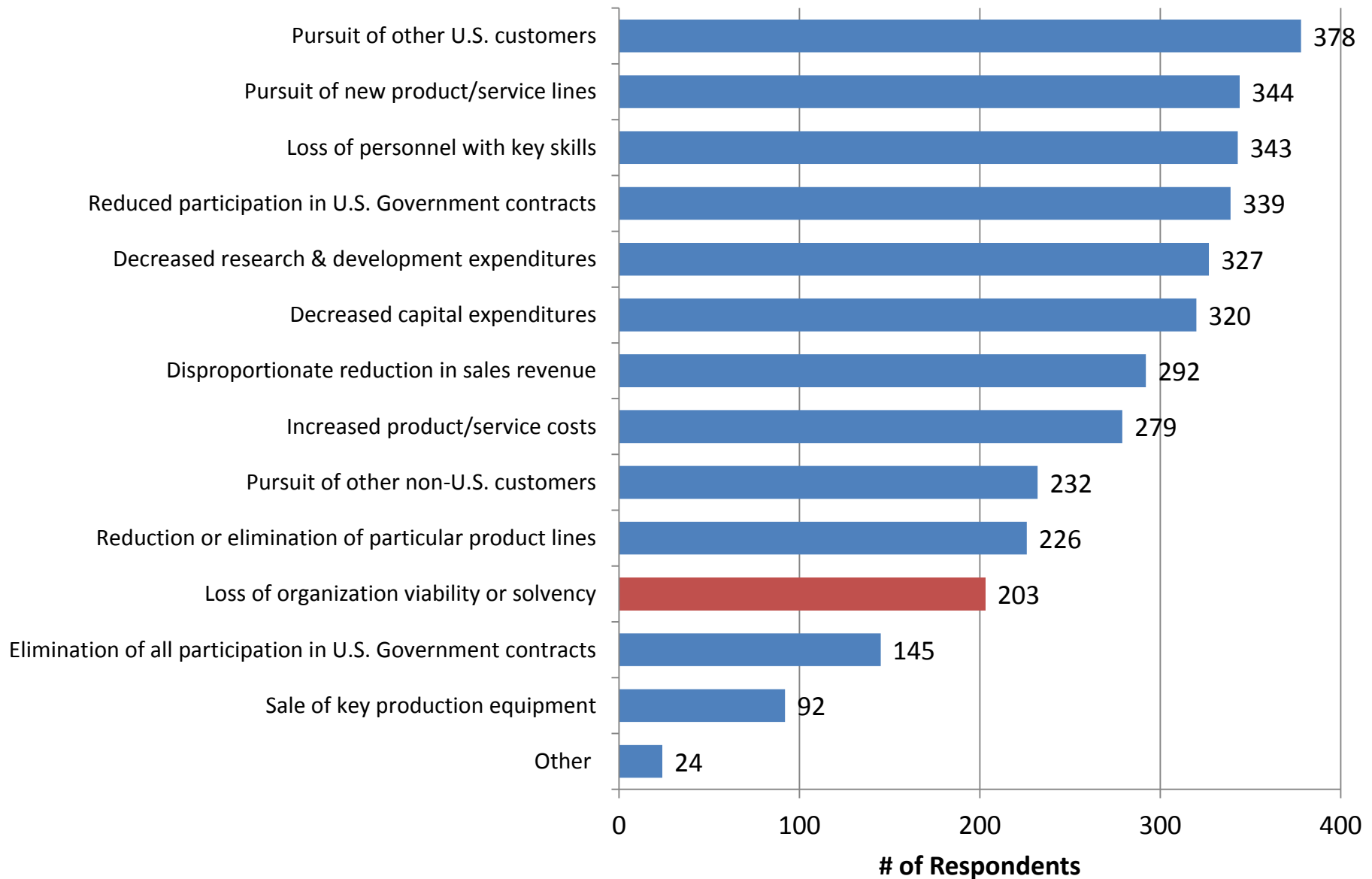
- “Get Congress to pass the national authorization and appropriations bills on time so our Government contracts don't get constipated during Continuing Resolution Authority (CRA) scenarios! We recently had to lay off high-tech staff for whom we couldn't cover payroll despite having been selected for NASA contracts that would have covered their payroll -- NASA couldn't award the contracts due to CRA. In other cases, we've had severe cash flow crises when incremental funding on existing contracts was delayed due to CRA. It's insane that we can't depend on the Government to fund us on time for effort for which we we're staffed on the basis of selected or awarded contracts.” – Small company
- “More consistent funding. We waste a lot of time bidding for projects that never get funding.” – Medium company
- “Establish a space policy to require interagency interoperability of space-related product. Aggregate hardware demand and collaborate with demand forecasting and planning while pooling funding with similar product. Eliminate redundant procurement, logistics processes, and sources of supply. Pursue agile manufacturing and supply chain management/Product Lifecycle Management disciplines” – U.S. Government Agency

# Steps the USG Can Take to Incentivize the Provision of Specialty, Low-volume or One-time, Space-Related Products/Services

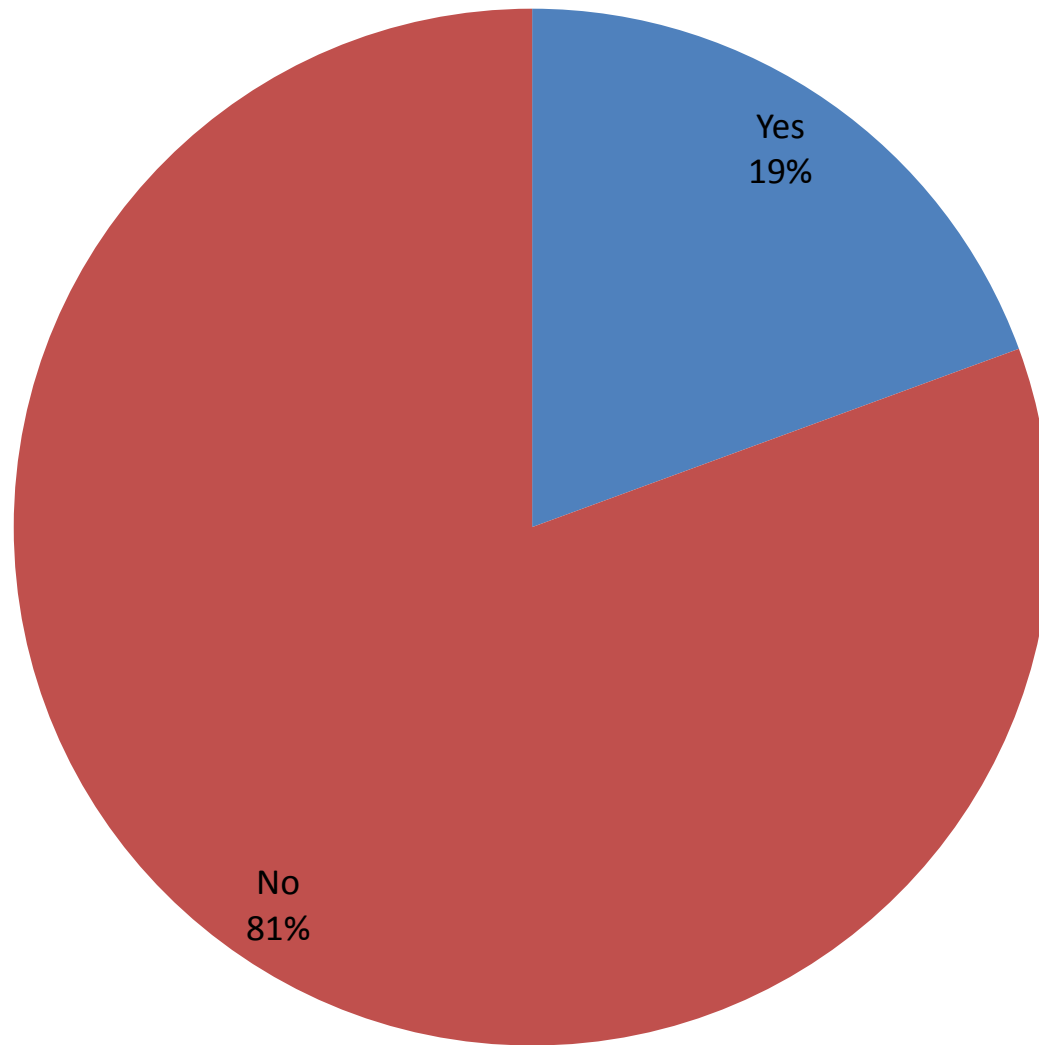
## Theme: Broader Customer Base

- “At this point, international space or privately-funded space activities would be the only alternatives to sustain our company if the US government became a low-volume customer of ours. ITAR stands as a barrier to the international customer base, and the privately-funded space activities are still very immature.” – Very small company
- “Clearly define the difference between space-related products that are ITAR vs. EAR controlled.” – Large company
- “Current barriers include space-related products/services being under the State department (ITAR) rather than Commerce (EAR) and the requirement for validated EVM (which is inconsistent with federal cost-principles for educational institutions).” – University

## Potential Impacts of a Sudden Decrease in USG Space-Related Demand

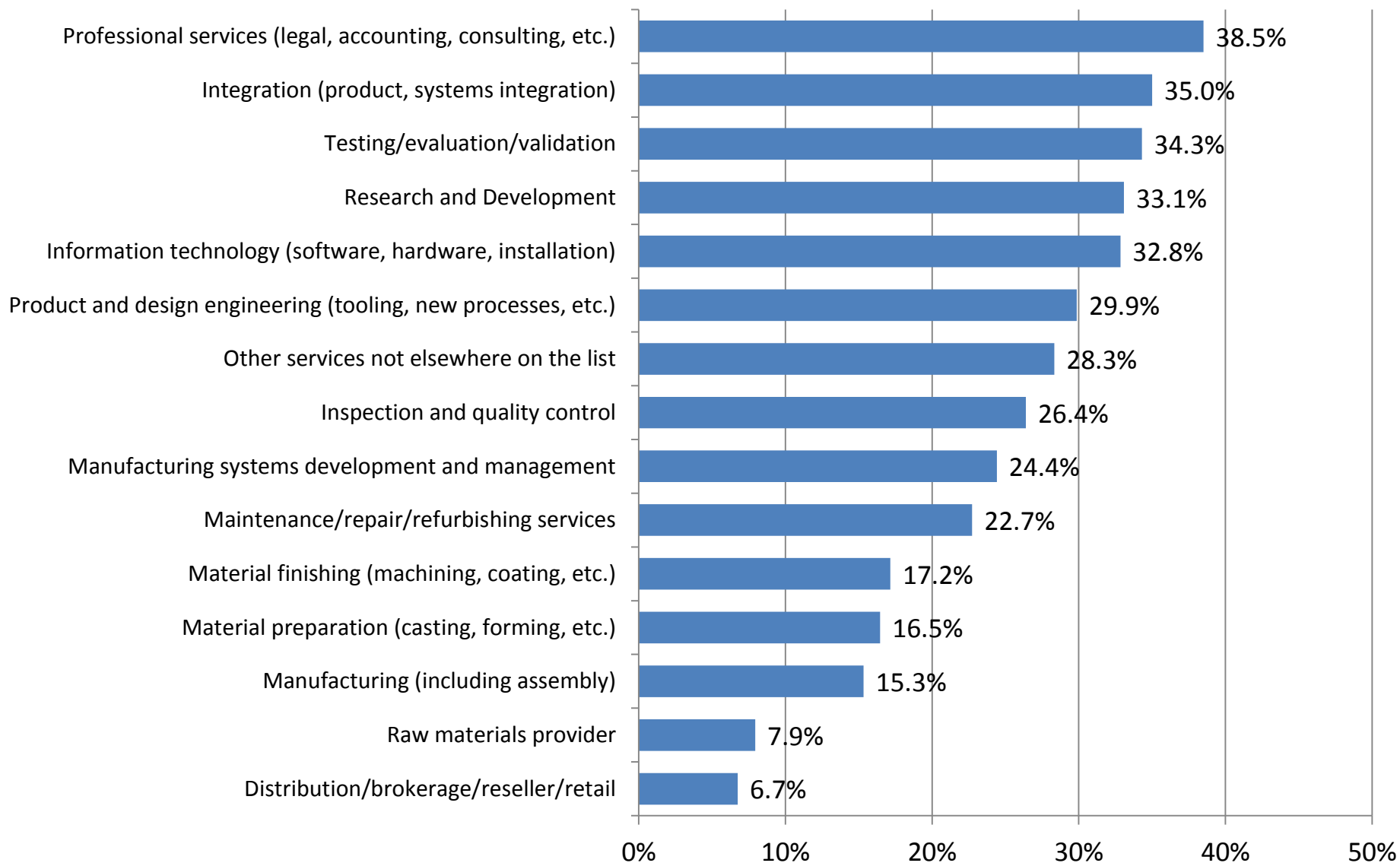


## Self-Identified Dependency on USG Space Programs



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

## Percent of Respondents Dependent on USG Space-Related Programs by Primary or Additional Business Line

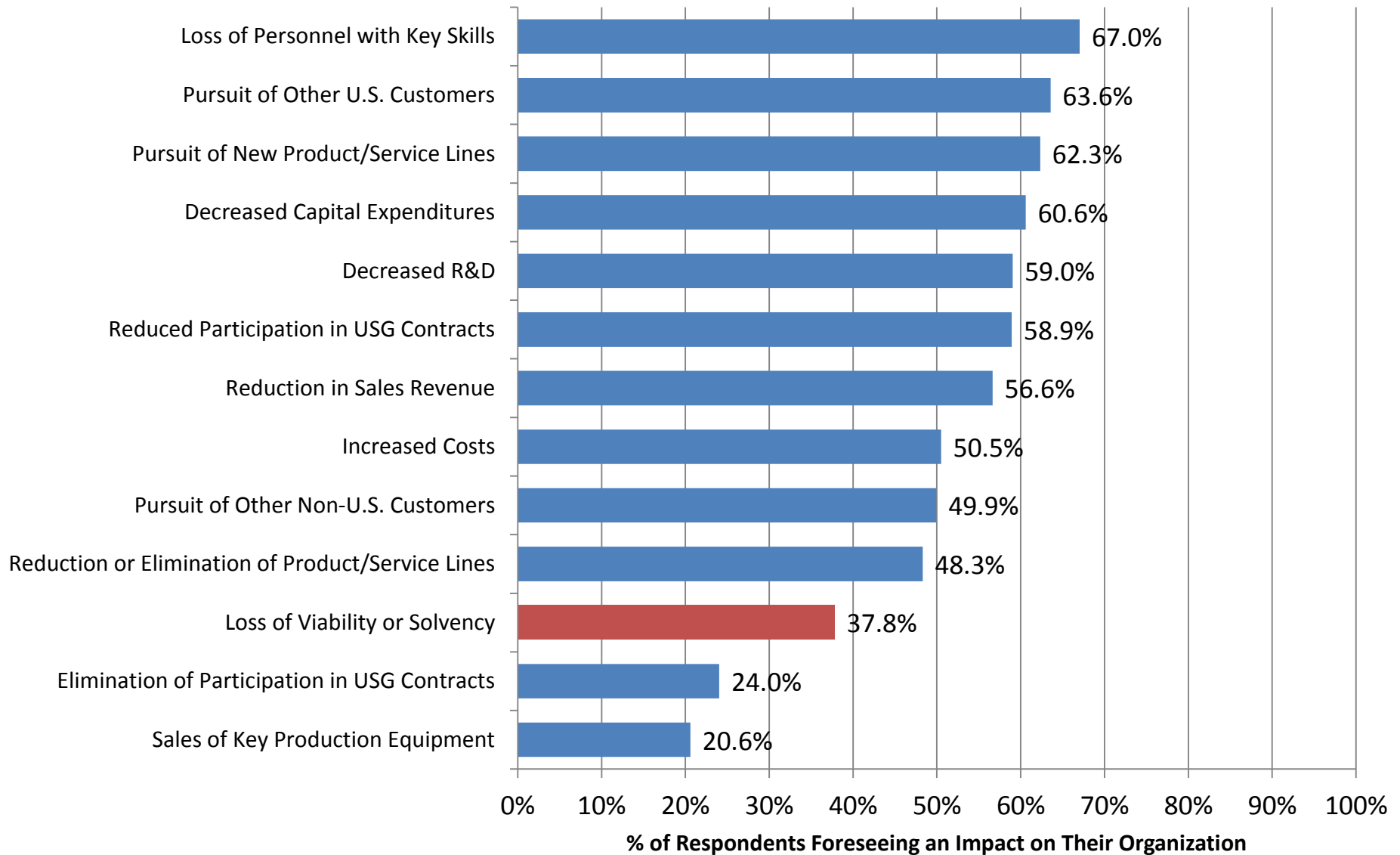


# Dependency on USG Space Programs

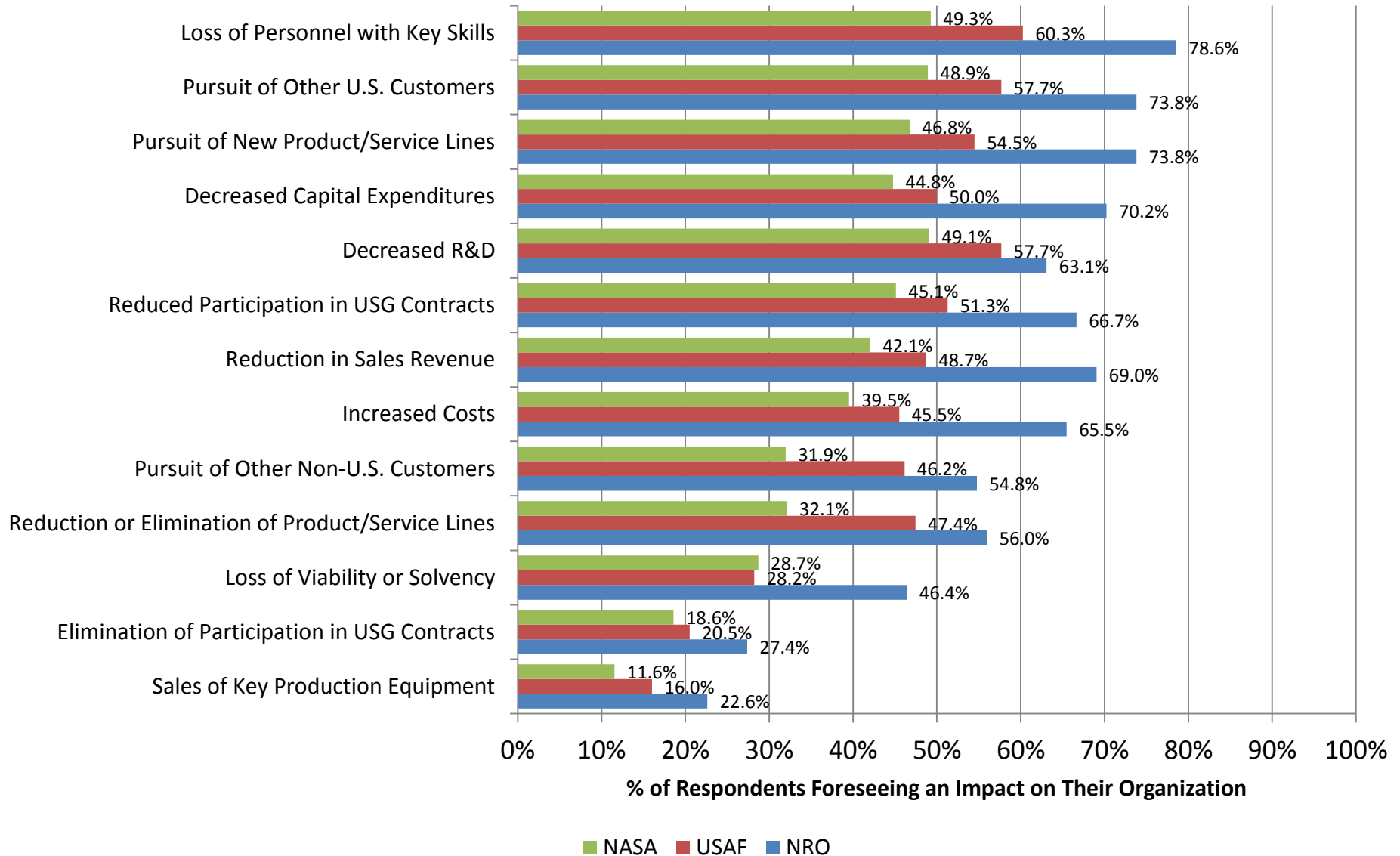
- “Government programs historically provide cutting edge technology opportunities that develop skills, tools, high level technical talent. These programs support the continued evolution of high technology products.” – Large company
- “University-based space science is almost entirely assistance/procurement funded and requires government programs to be viable.” – University
- “In our field of research, i.e., cryogenics and cryocoolers, we highly depend on Government space-related programs. Commercial markets for our type of services and products are very limited. Future commercial space programs that include exploration may apply our technologies.” – Very small company
- “Our business base is diverse enough that we would not become unviable if our space-related programs were to end or decrease. We would, however, suffer substantial harm to our business as space-related programs make up more than 50% of our business. We would certainly experience significant personnel lay-offs.” – Large company
- “Our organization is aligned to core and high priority space programs to minimize our exposure to cancellation of current space related programs. In the event of a cancellation a program we support it is highly likely that most of our talented staff would find work in other less priority programs. However, I would expect our business base to be less stable and thus our viability as a corporation would degrade. “ – Very small company
- “Yes...we miss the Space Shuttle” – Very large company



## Potential Impacts of a Sudden Decrease in USG Space-Related Demand – Respondents Providing Space-Related Support



## Potential Impacts of a Sudden Decrease in USG Space-Related Demand – Respondents Providing Space-Related Support



## USG Agencies with the Greatest Percentage of Respondents Expecting Impacts from a Sudden Decrease in USG Space-Related Demand

Most Impacted Among Respondents Providing Space-Related Support:	Most Impacted Among Respondents Providing Non-Space-Related Support:
1. NRO	1. NGA
2. NGA	2. NRO
3. CIA	3. MDA
4. DARPA	4. DARPA
5. DDRE	5. NSA
6. NSA	6. DDRE
7. NOAA	7. FAA
8. MDA	8. DOE
9. FAA	9. U.S. Air Force
10. U.S. Army	10. U.S. Army

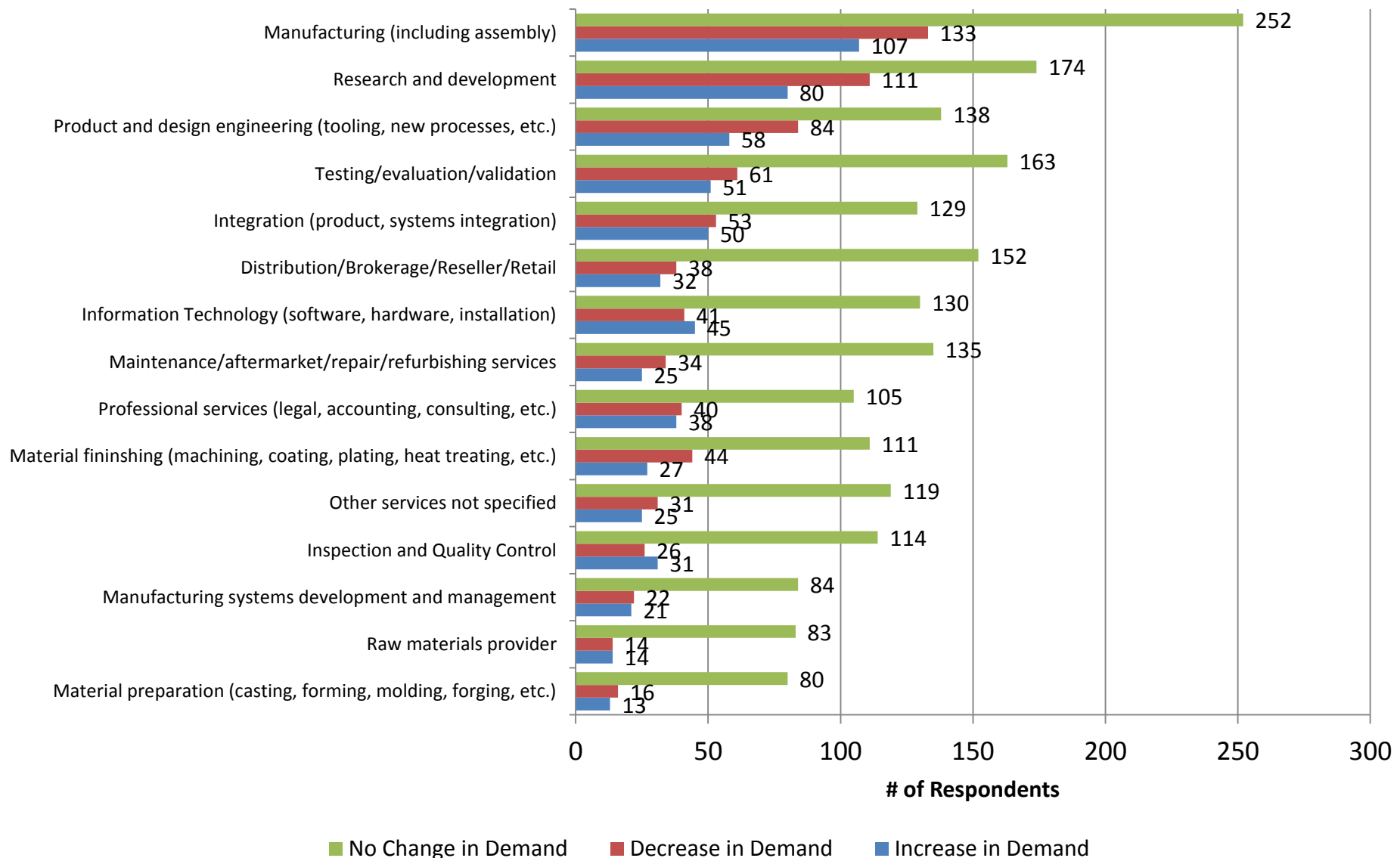
# Continued Desire to Work With the USG

19 percent (206 of 1,087) of respondents said that variability in demand from the USG for space-related products and services have **somewhat or significantly adversely impacted** their desire to serve these customers.

## Adverse Impacts:

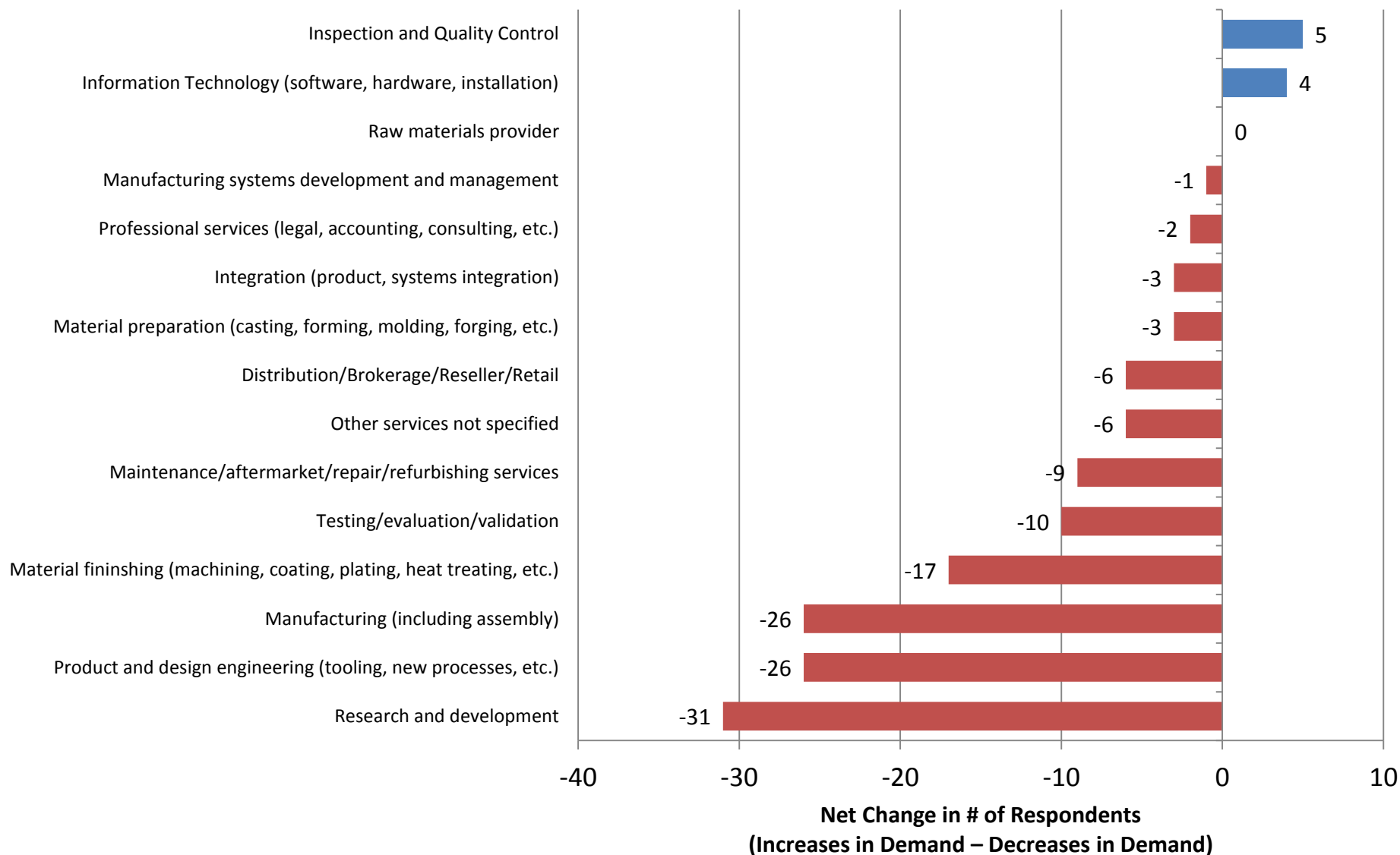
- “Variation in year-to-year R&D budgets over the last 2 - 3 years due to changes in program priorities, federal budget pressures, cancellation of key programs has had a significant negative impact on our business stability over those years. Hiring and other long range investments have been strongly affected” – Very small company, Georgia.
- “The decrease in USG space programs has fundamentally changed the outlook for several of our clients and just as importantly it has significantly impacted several potential clients resulting in a drastically reduced demand for services we provide. Consequently, while we are still interested in this segment, the market outlook is much more somber than it was just 2-3 years ago” – Very small company, Texas.
- “Desire unchanged, just fewer opportunities” – Very small company, Nevada.
- “This is the work we do and we love it. We do it by choice. We are very dependent on the US government, but we couldn't do the same work in any other context. So we just keep doing it, even if it's not always stable. A lot of great talent is leaving the industry because of this, though. The massive NASA layoffs of last year are a sad example of that” – Very small company, Texas.

# Change in Space-Related Customer Demand for Respondents' Business Lines (2009-2012)

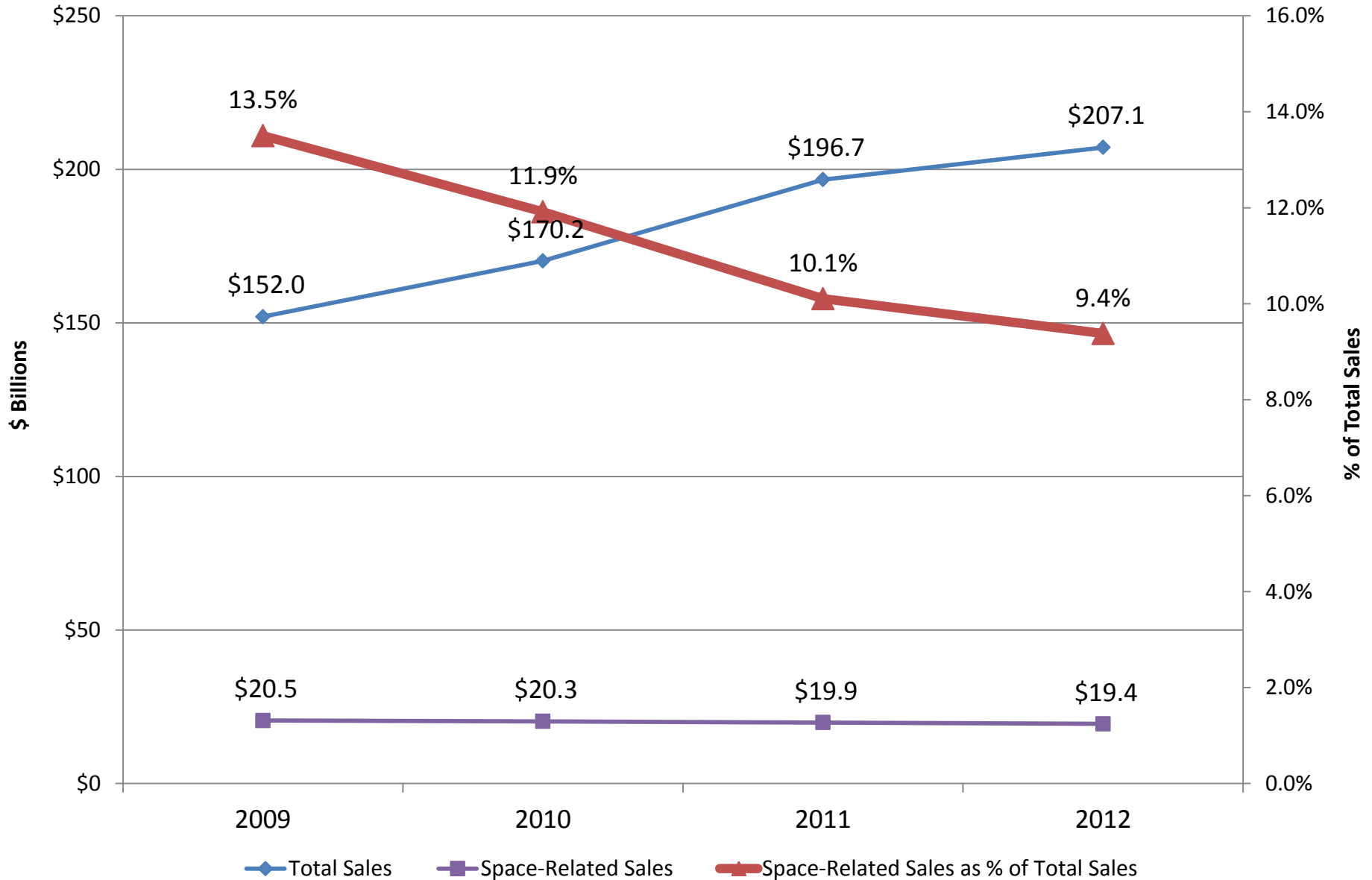


Source: U.S. Department of Commerce, Bureau of Industry and Security,  
U.S. Space Industry Deep Dive, Preliminary Data – October 2012.

# Net Change in Space-Related Customer Demand for Respondents' Business Lines (2009-2012)

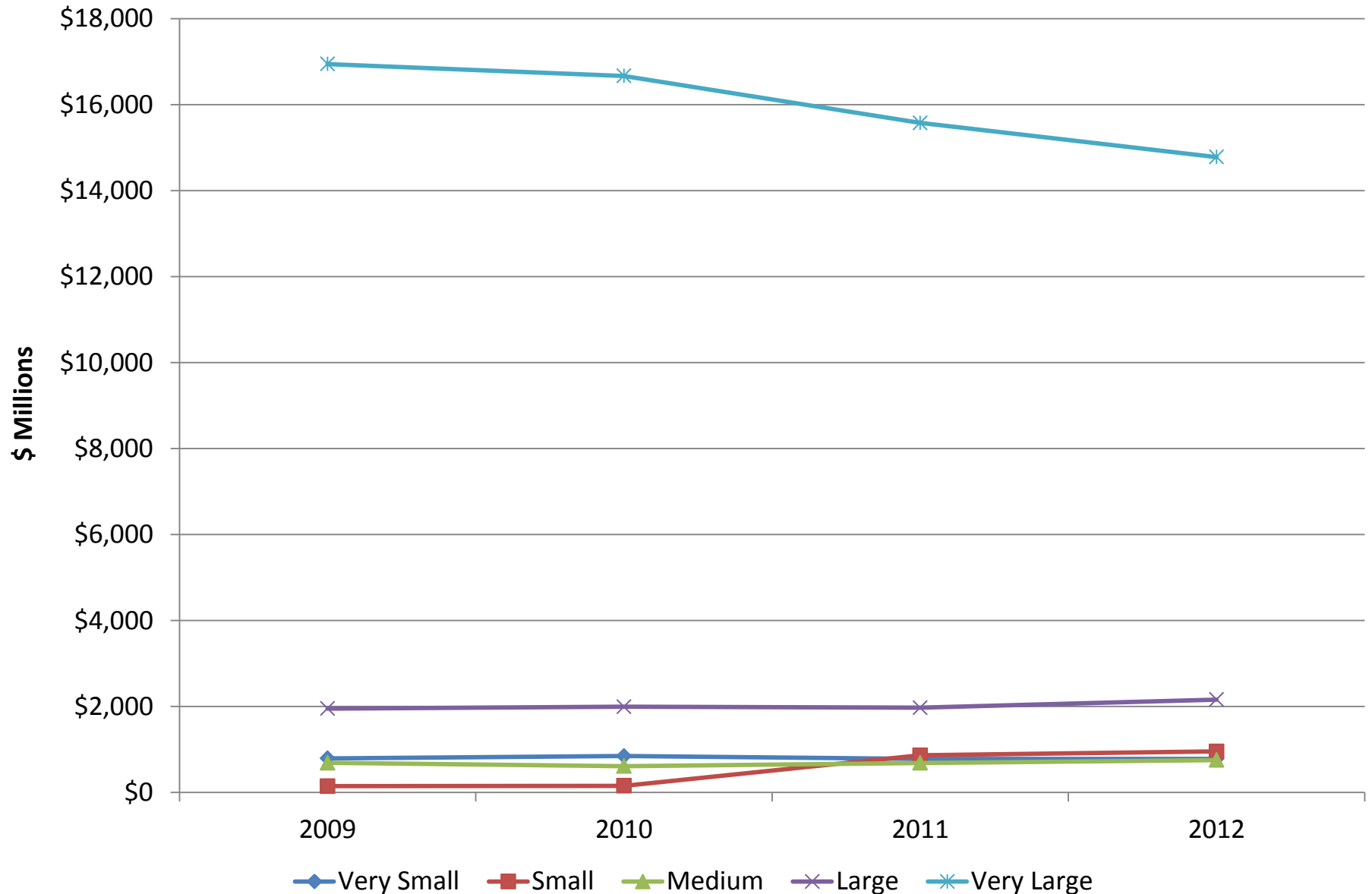


## Total Sales vs. Space-Related Sales (2009-2012)



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

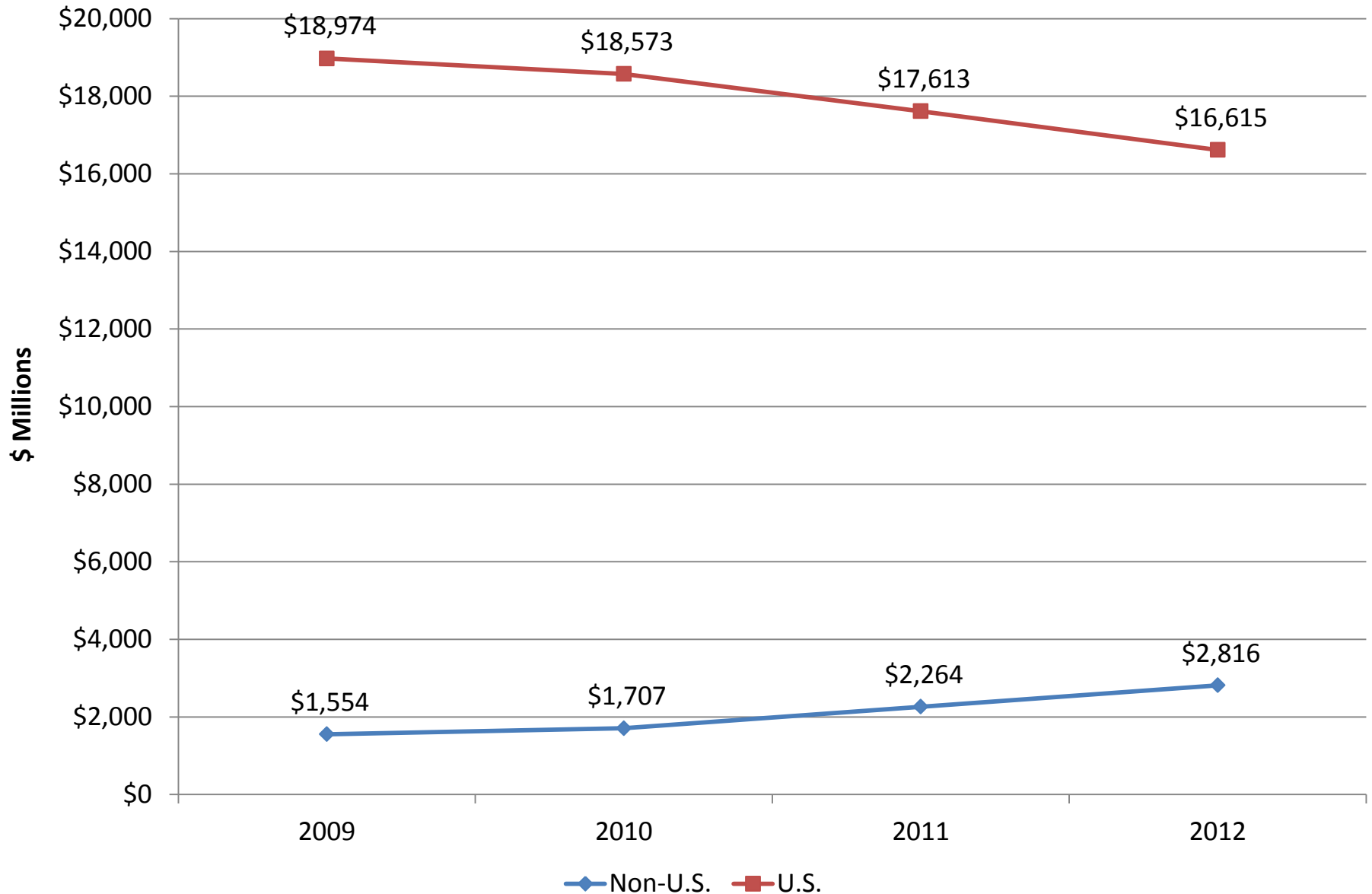
## Total Space-Related Sales by Respondent Size (2009-2012)



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

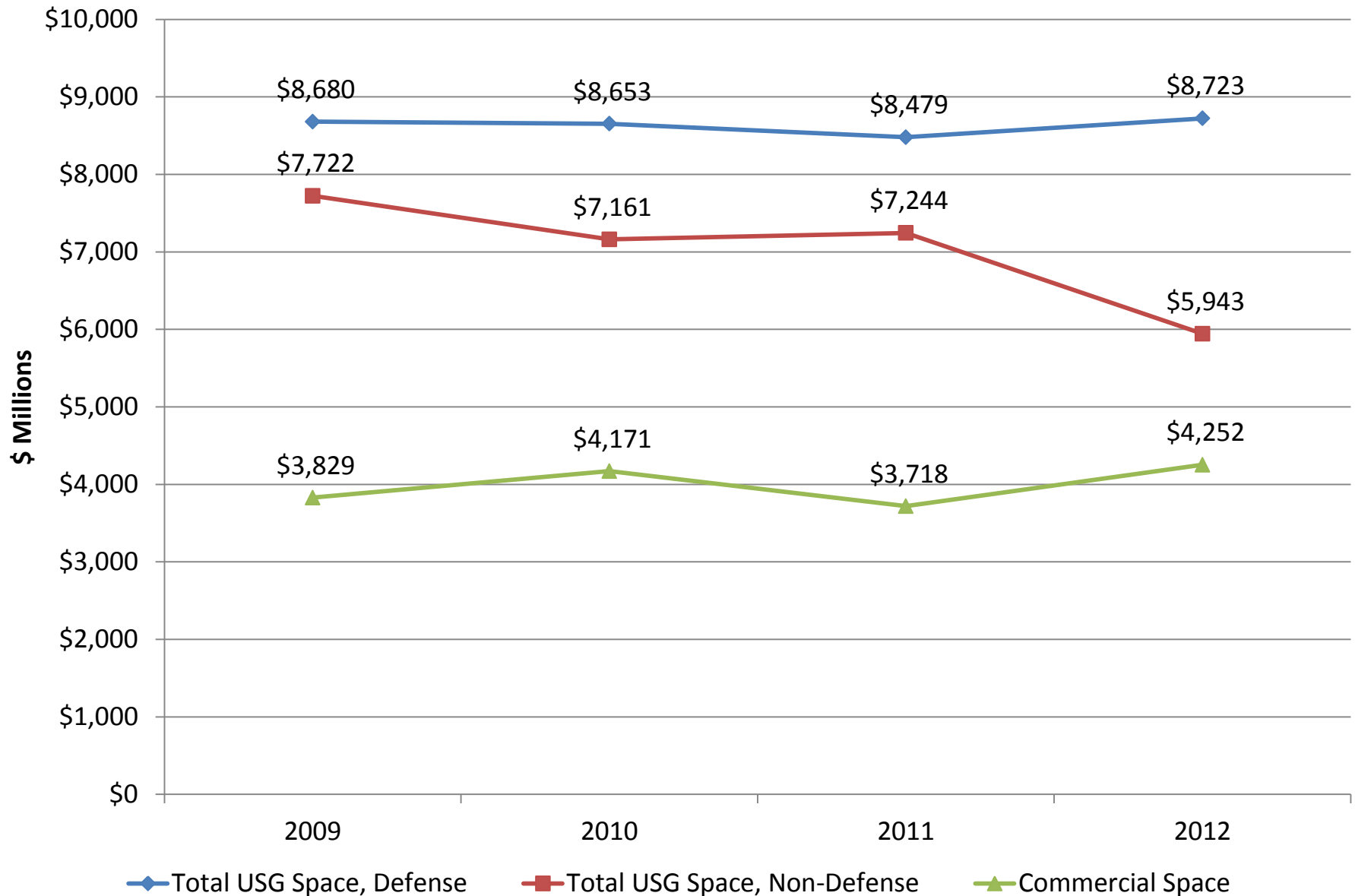


## Total Space-Related Sales by Location (2009-2012)

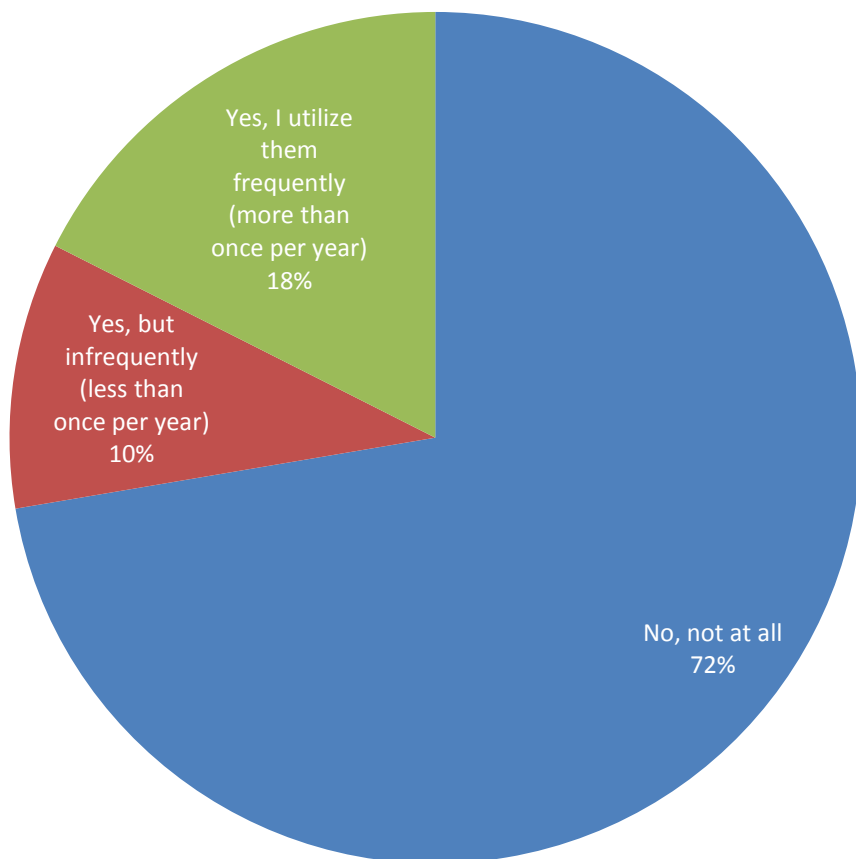


Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

## Total Space-Related Sales by Customer (2009-2012)



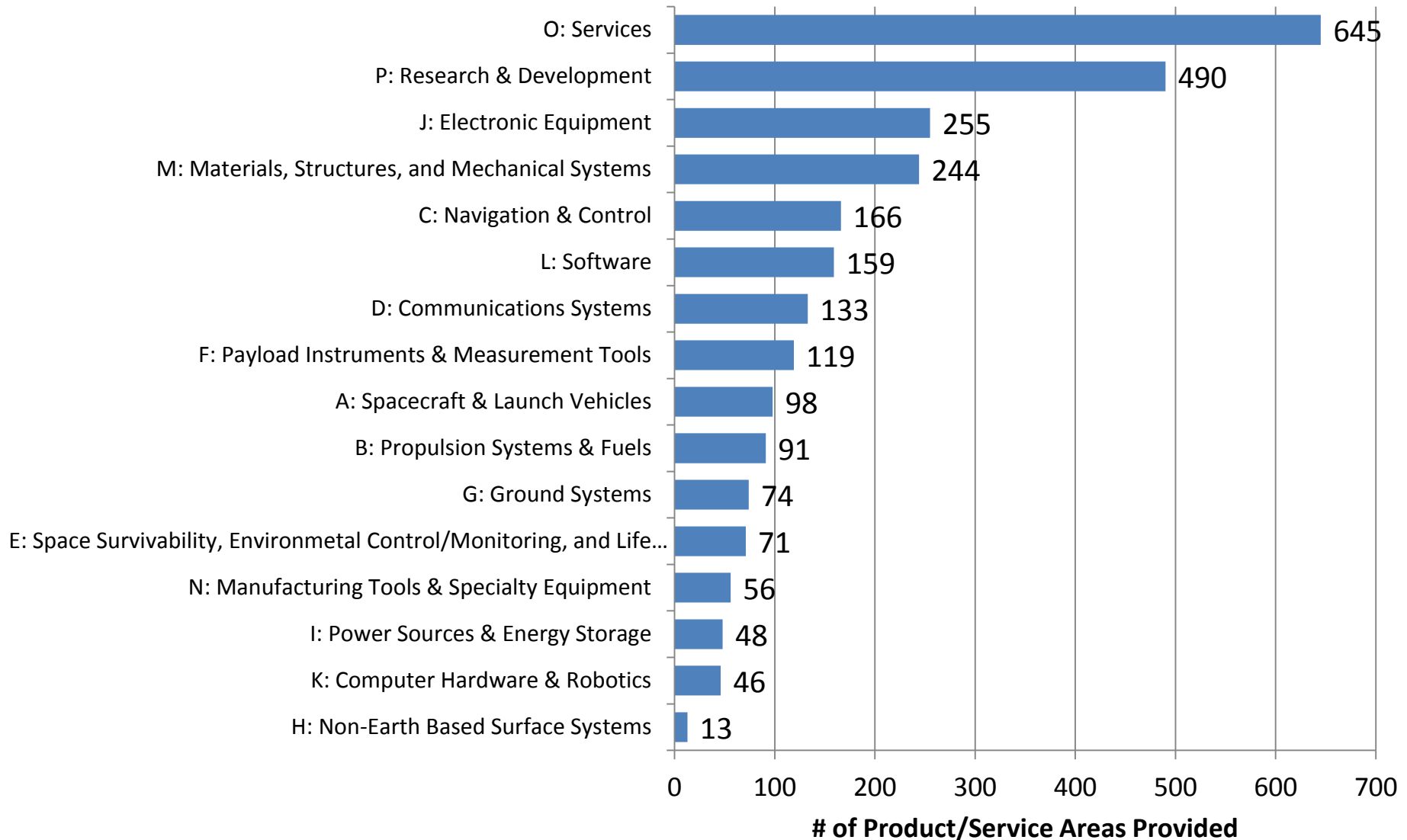
## Utilization of U.S. Export Control System (ITAR/EAR) for Space-Related Products/Services



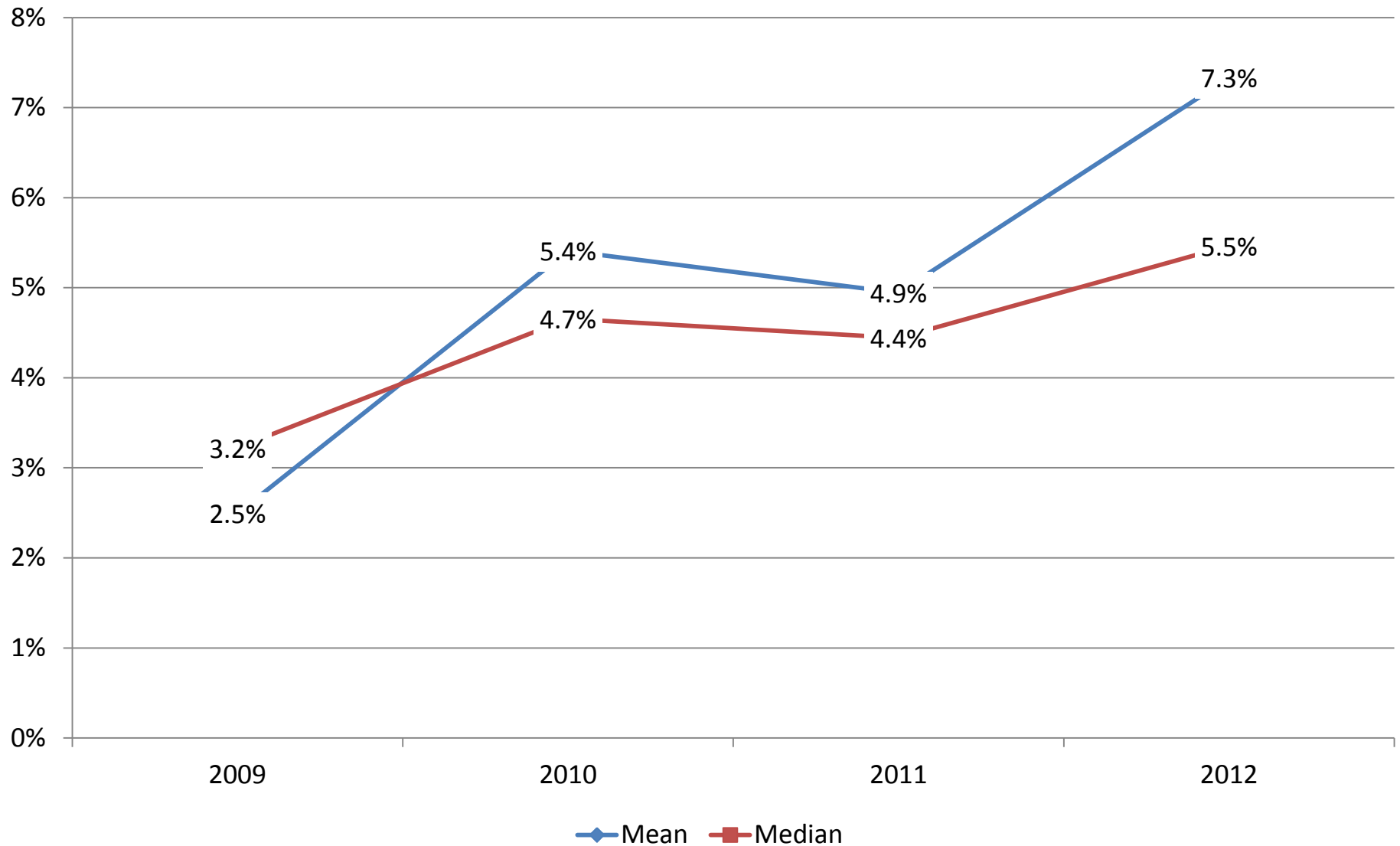
### Impacts of U.S. Export Regulations on Space-Related Products and Services

Impact	% of Respondents*
Avoided the export of space-related products or services subject to ITAR-related controls	37.5%
Incentivized non-U.S. organizations to “design-out” or avoid buying U.S. origin space-related products or services	31.2%
Avoided the export of space-related products or services subject to EAR-related controls	26.2%
Incentivized non-U.S. organizations to offer “ITAR-free” space-related products or services	24.6%
Contributed to the creation of non-U.S. companies/business lines in direct competition with the organization’s space-related products or services	19.3%
Caused the abandonment or alteration of space-related business lines	13.0%
Caused re-location of space-related production/R&D facilities outside the United States due to regulatory burdens	3.0%
* Based on 301 respondents that selected “Yes” to utilizing U.S. export controls for space-related products.	

# Products and Services Provided by Respondents Utilizing U.S. Space-Related Export Controls



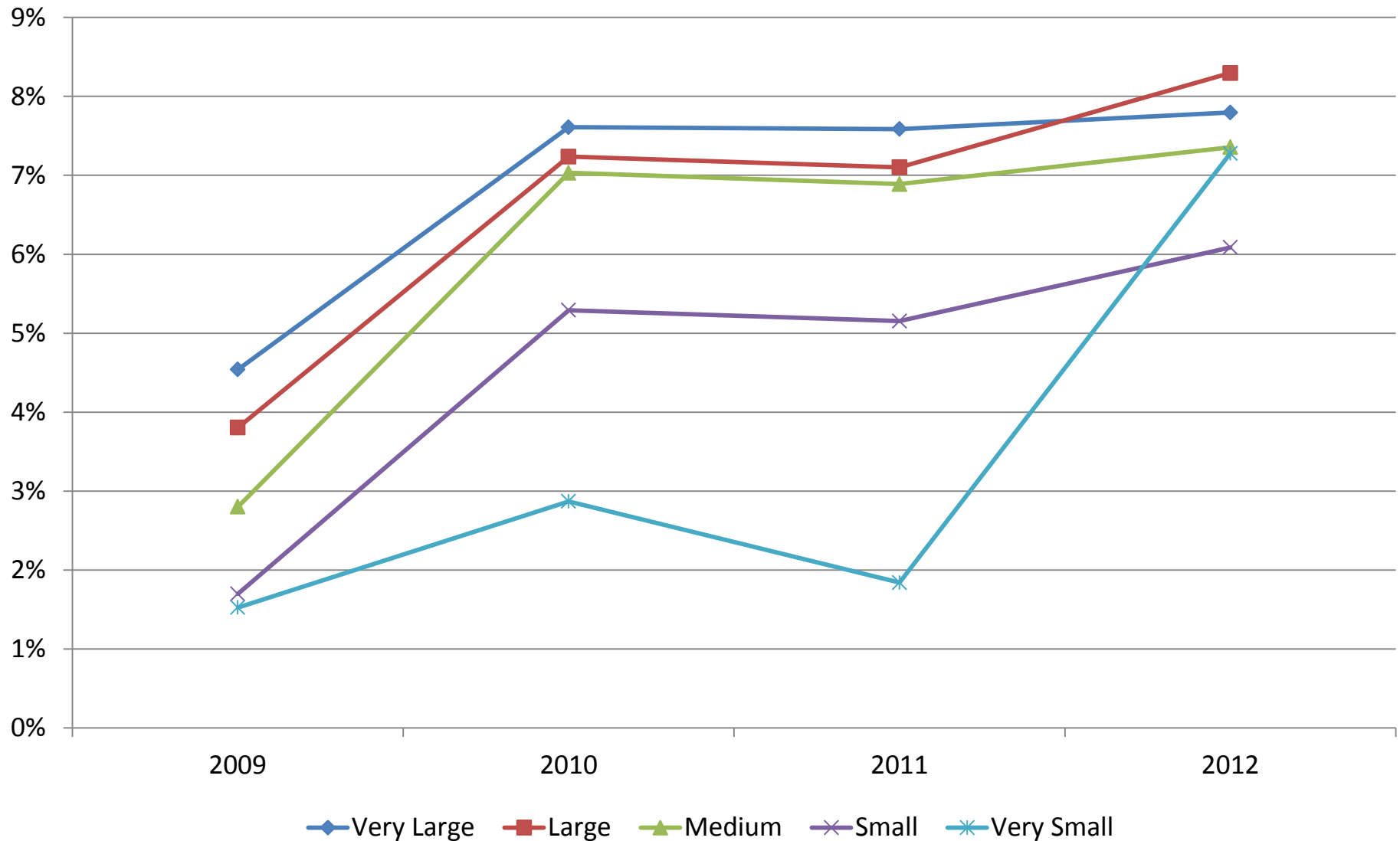
## Respondents' Net Profit Margin (after tax)\*



\* Based on 1,003 responses

Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

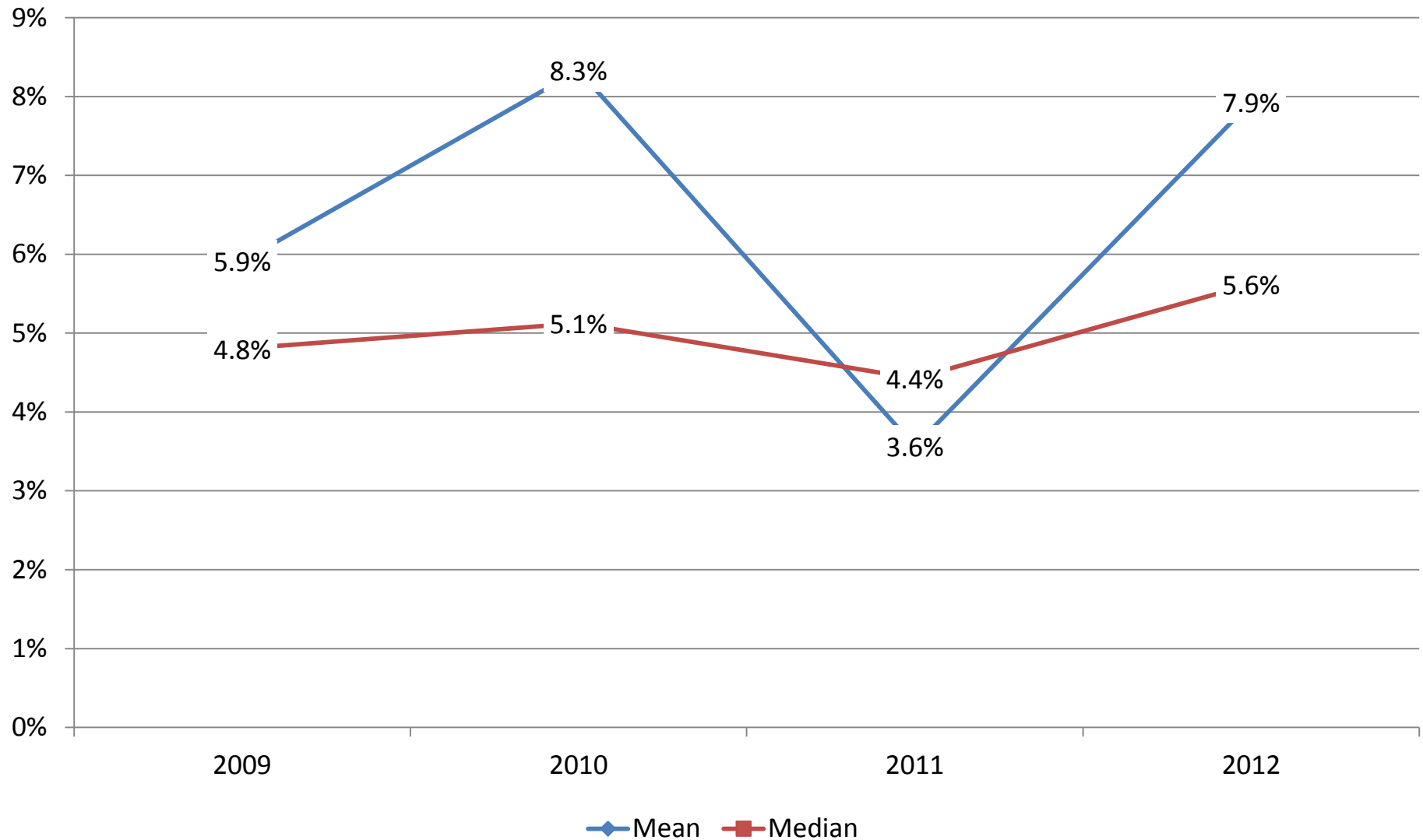
## Respondents' Net Profit Margin (after tax) - Mean of All Commercial Companies, All Source



\* Based on 1,003 responses

Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

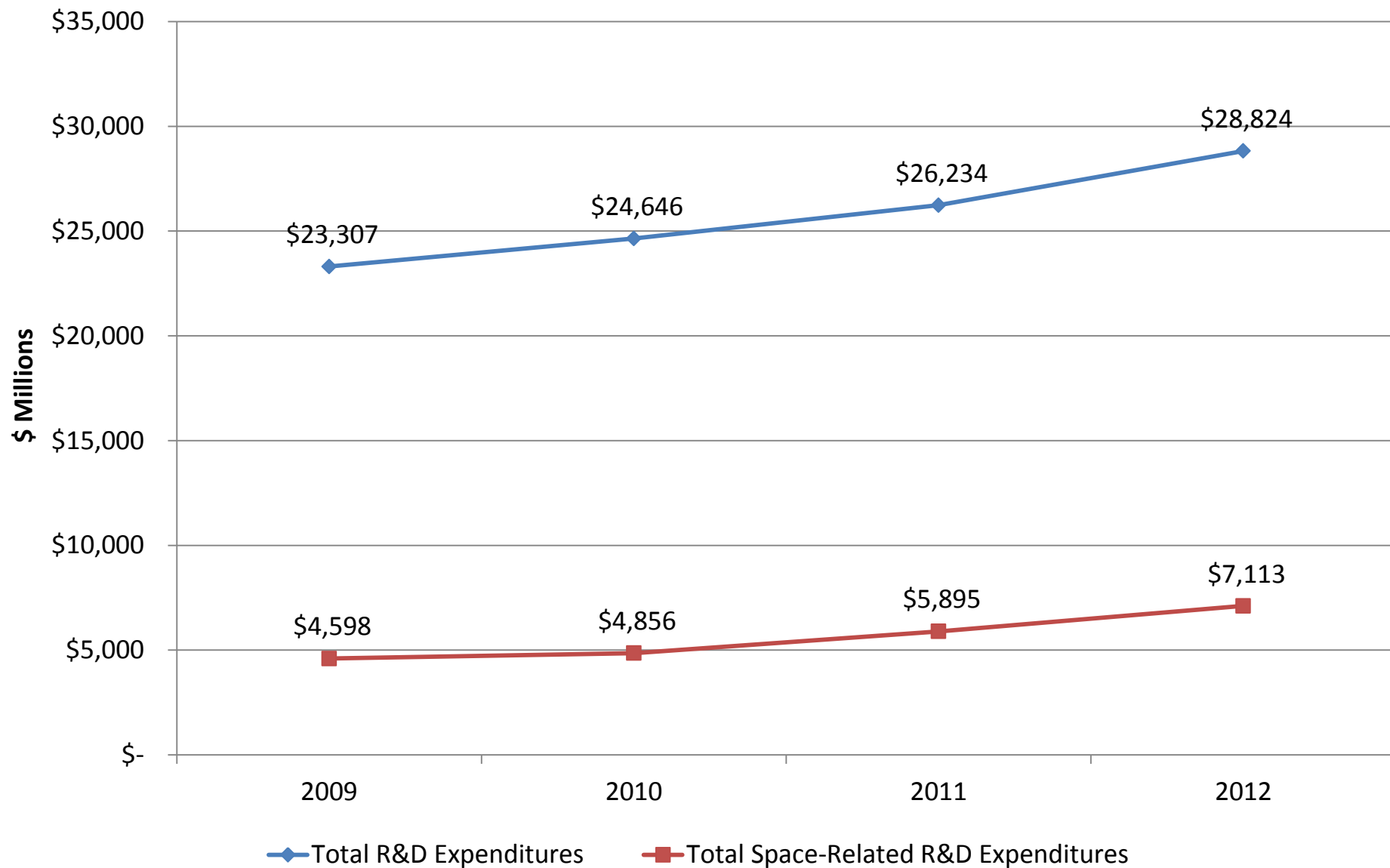
## Respondents' Net Profit Margin (after tax) - Commercial Companies Dependent on USG Space Programs, All Source



\* Based on 190 responses

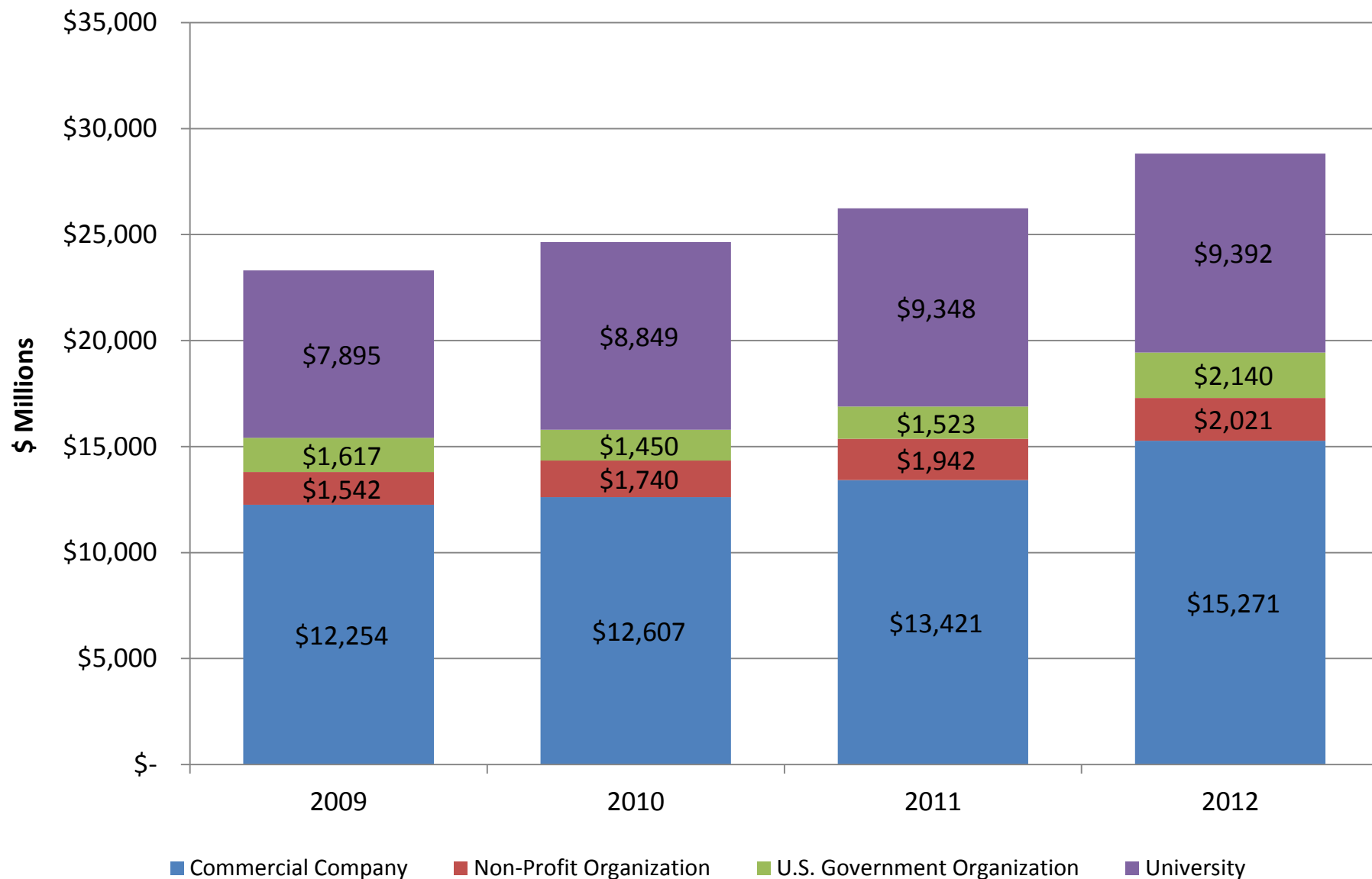
Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

## Total R&D Expenditures (2009-2012)

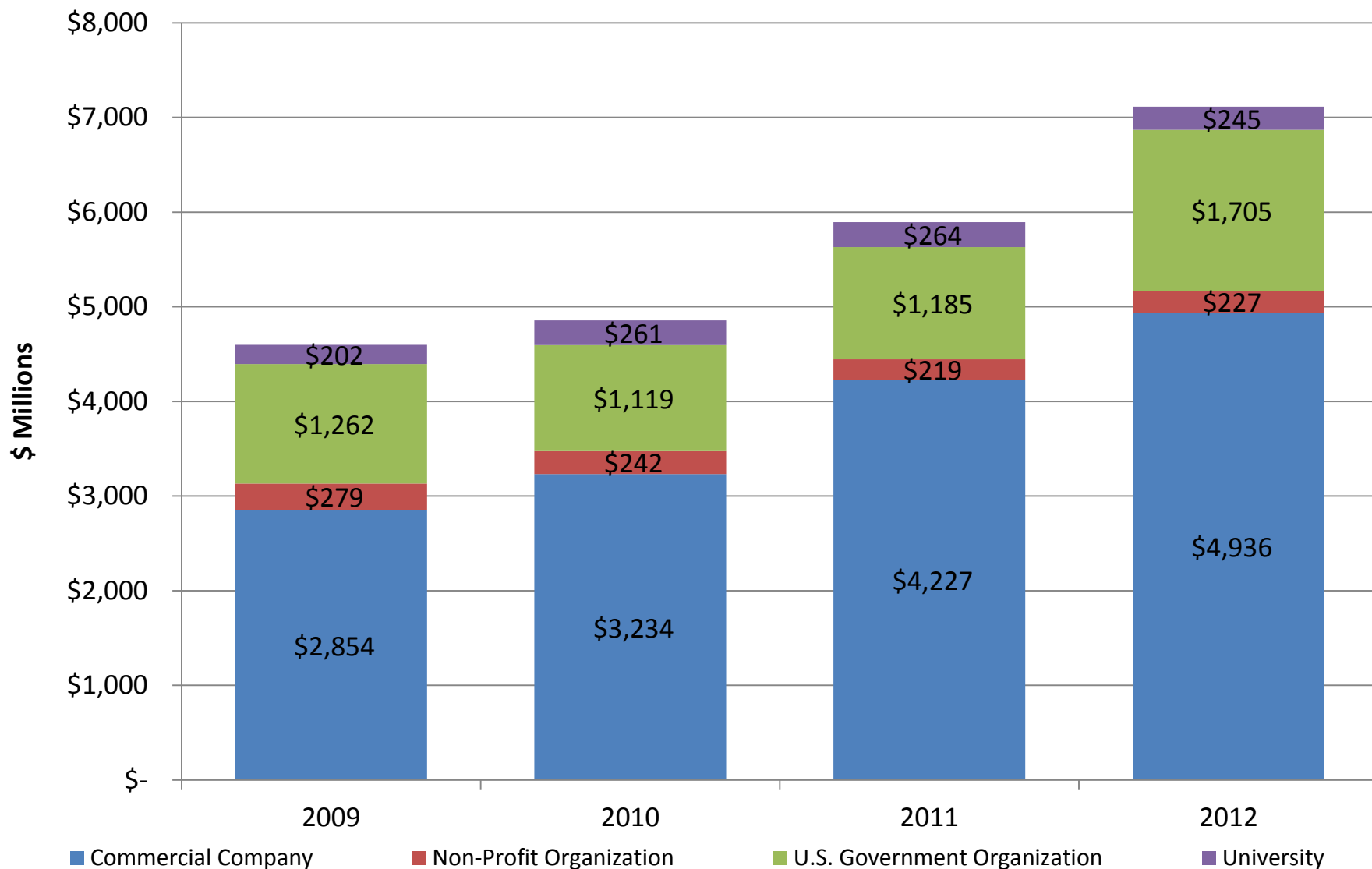




## R&D Expenditures by Respondent Type

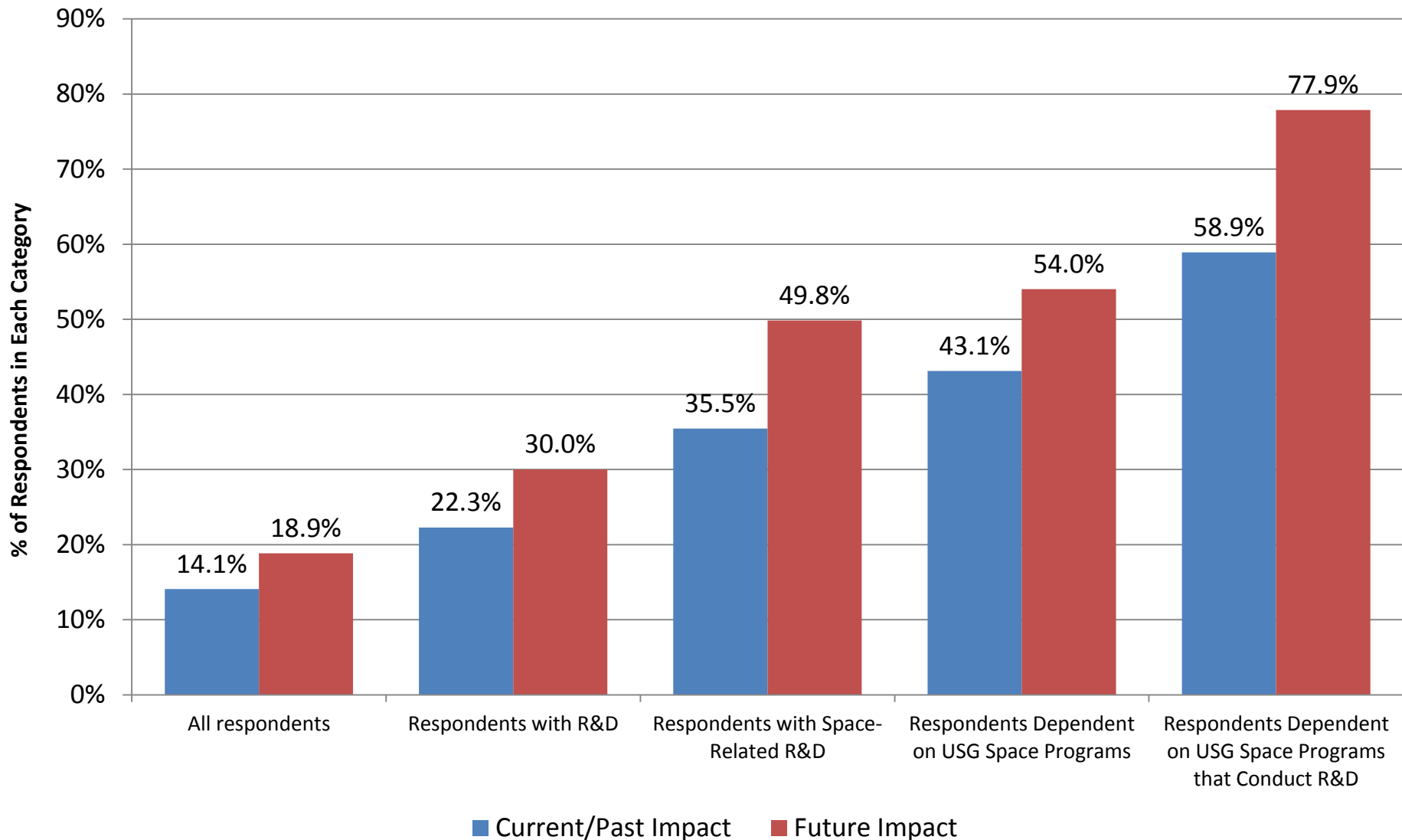


## Space-Related R&D Expenditures by Respondent Type



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

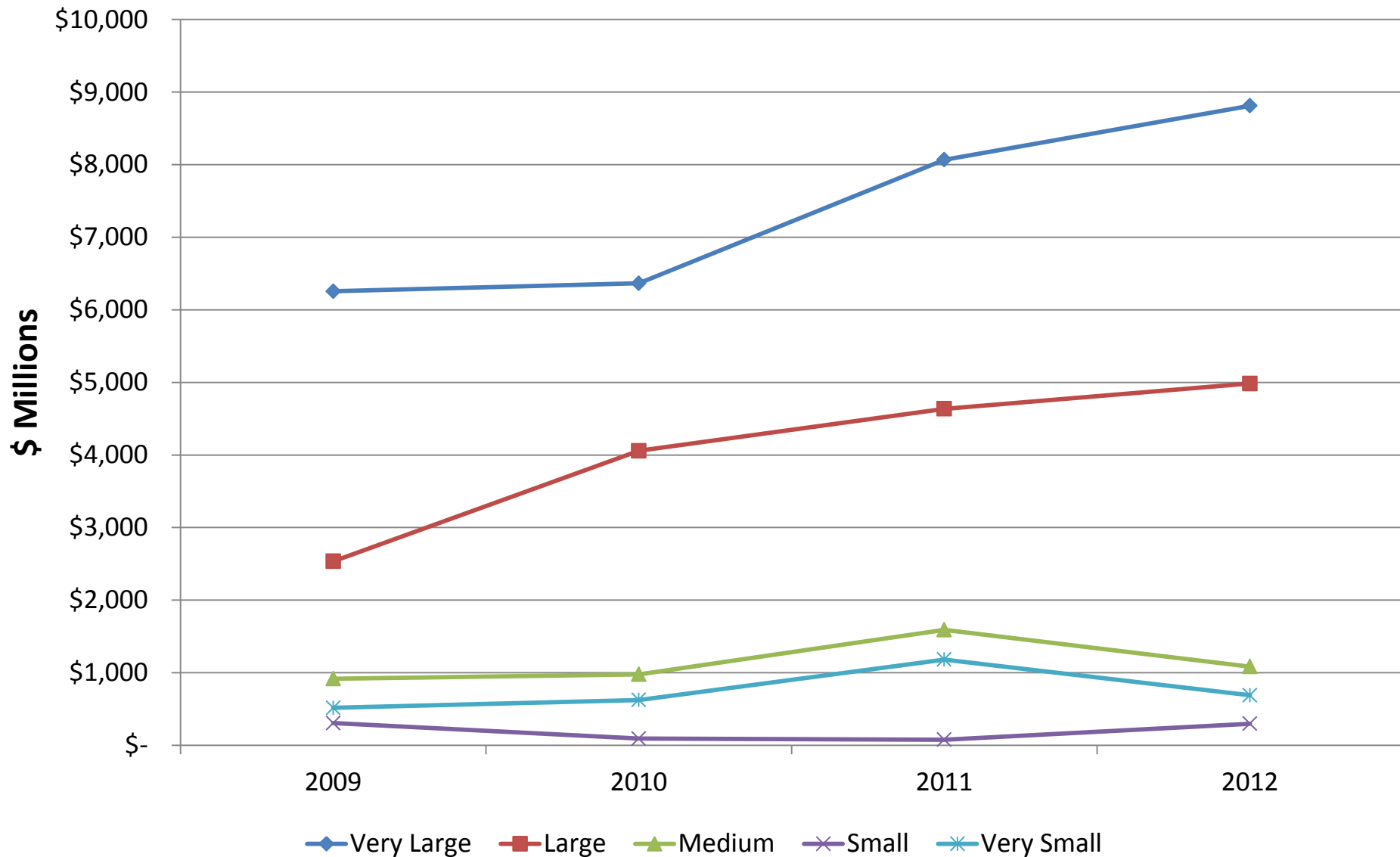
## Respondents Experiencing Moderate or Significant Adverse Impacts to R&D Due to Reductions in USG Space-Related Spending



## Adverse Impacts on R&D due to Reductions in USG Space-Related Spending

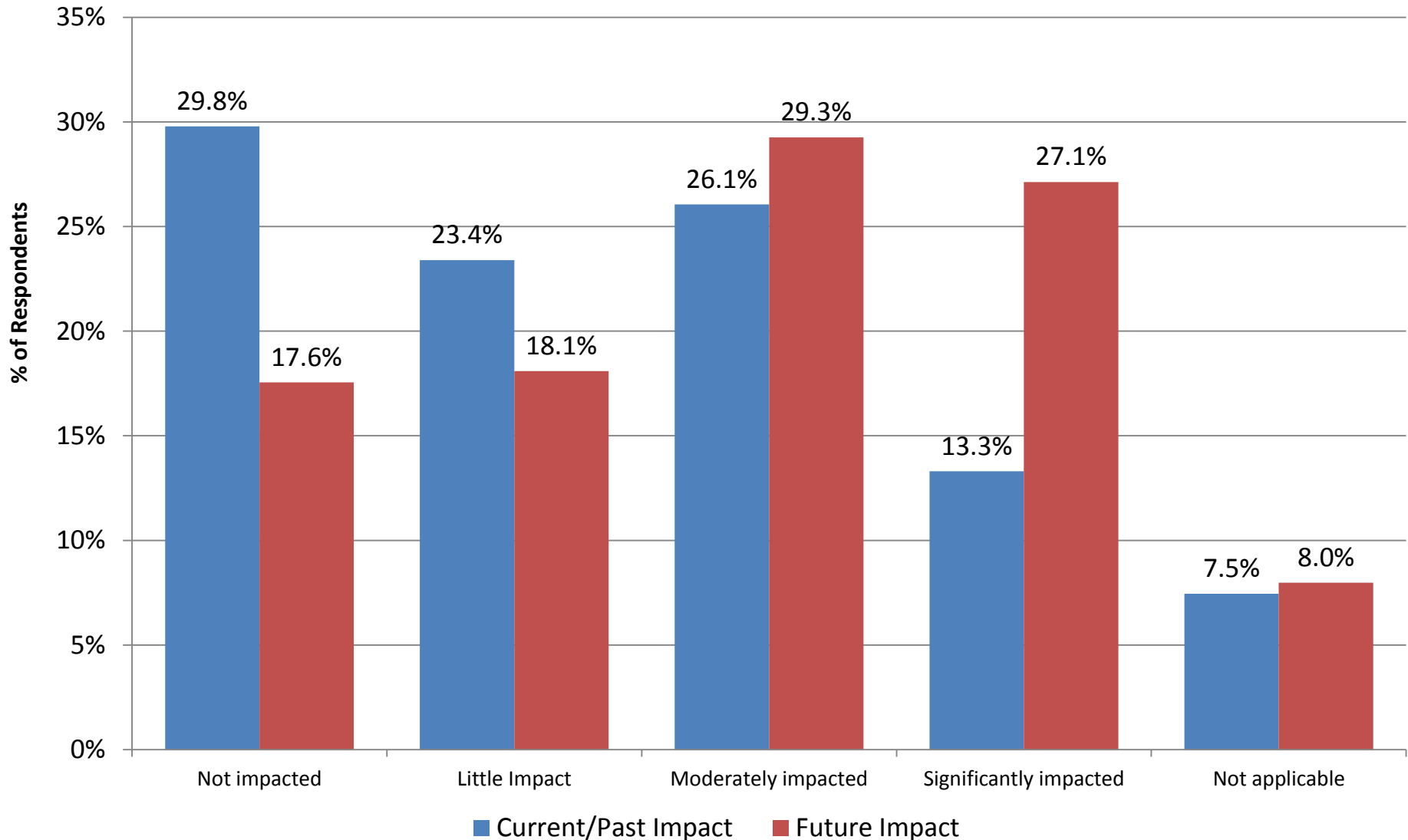
- “If space related spending is reduced, this will have an adverse affect. However, if budgets are reduced in certain government agencies (e.g. NASA) and applied instead to more efficient private sector companies (e.g. SpaceX) there will be little disruption and many benefits.” – Very small company
- “Our faculty and students interested in pursuing advanced degrees and careers in planetary - and/or space-related science must gain hands-on experience working with authentic NASA and/or mission-related data. A reduction in funding for these programs will adversely affect the potential for our faculty and students to access and gain experience in the field.” – University
- “Reduction in NASA human spaceflight (MPCV and SLS) contracts has effectively eliminated internal Research and Development activities.” – Very large company

# Commercial Companies' Capital Expenditures by Size

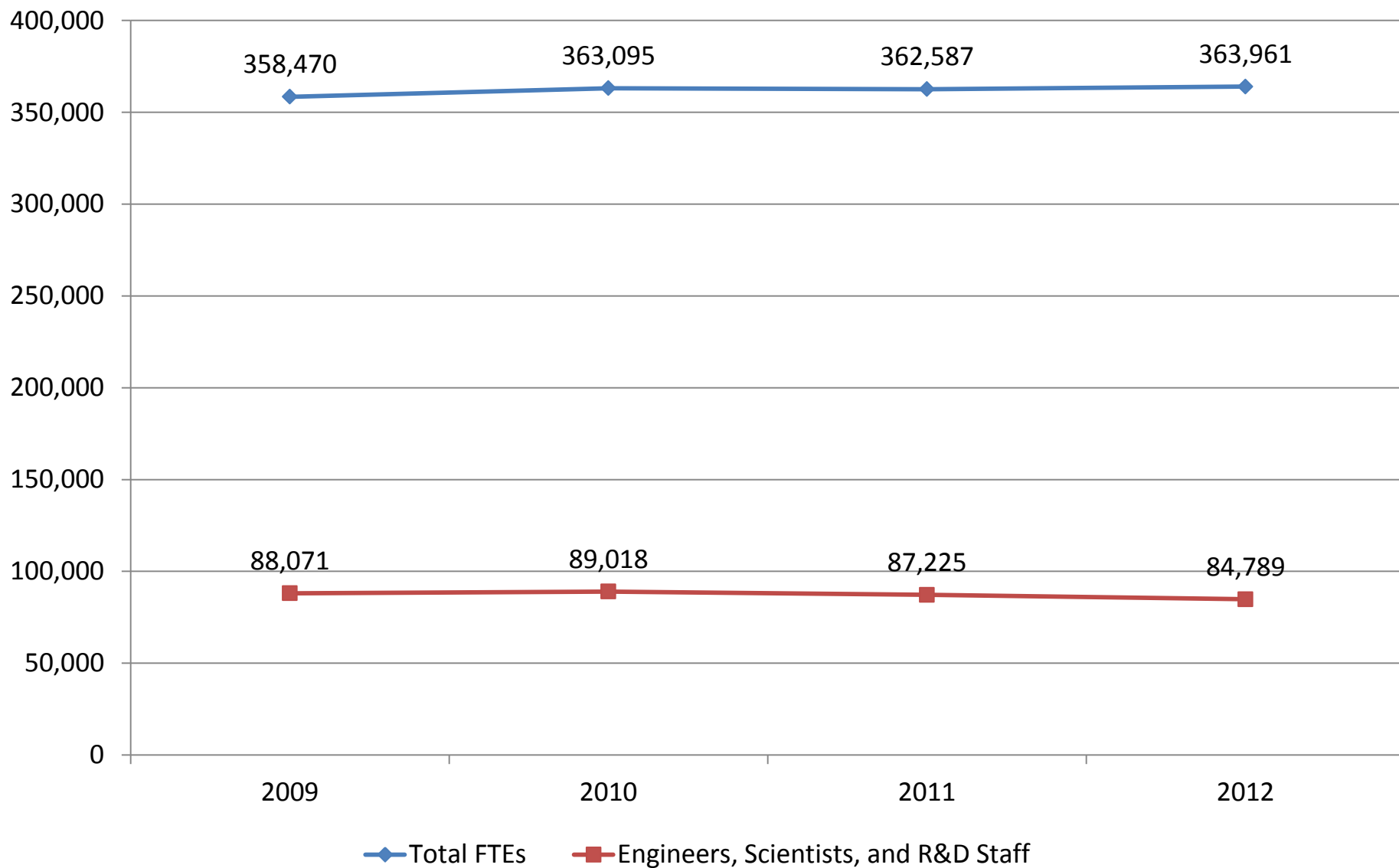


Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

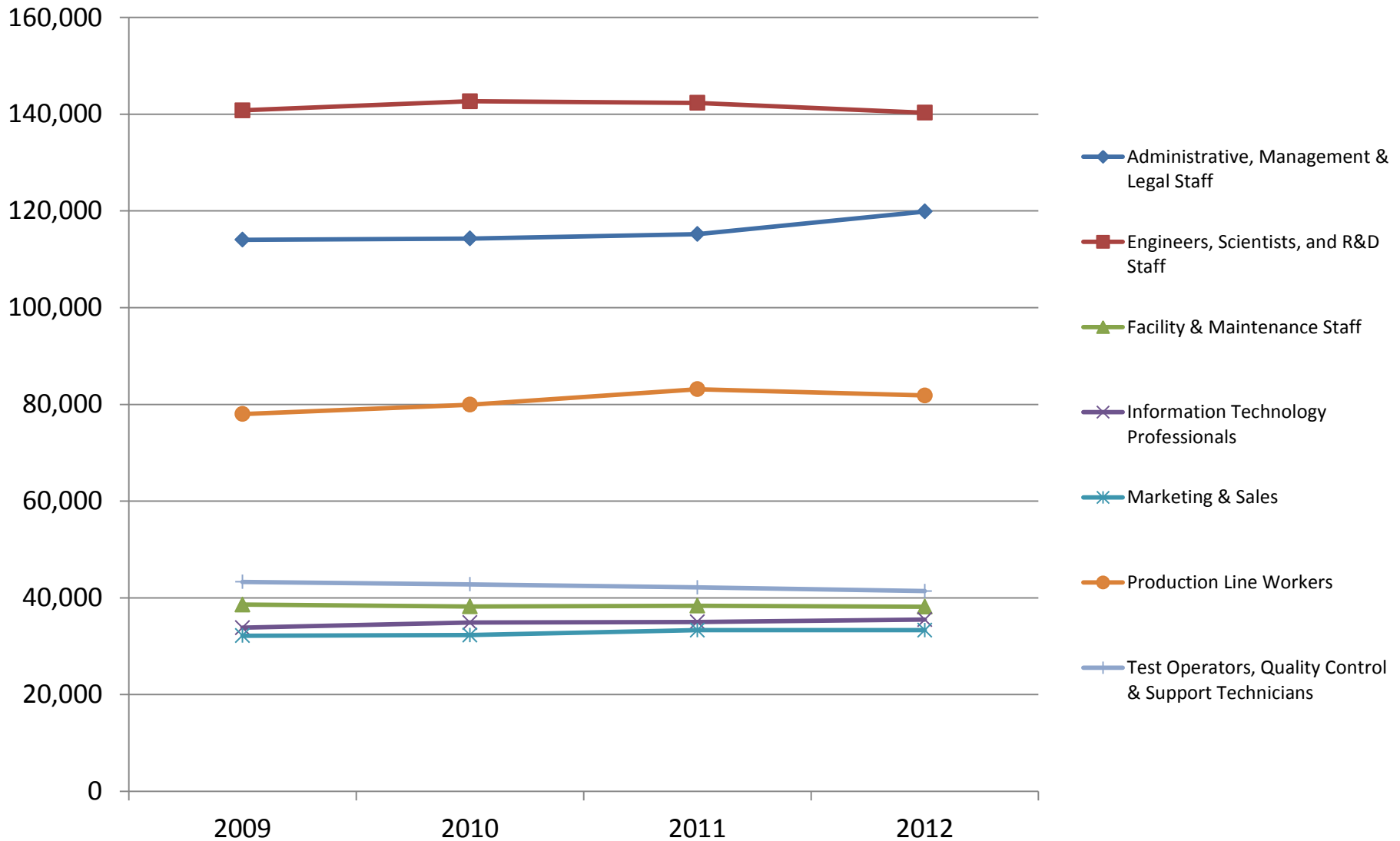
## Respondents Experiencing Moderate or Significant Adverse Impacts to Capital Expenditures Due to Reductions in USG Space-Related Spending



## Full Time Employees by Type (Excluding Universities)



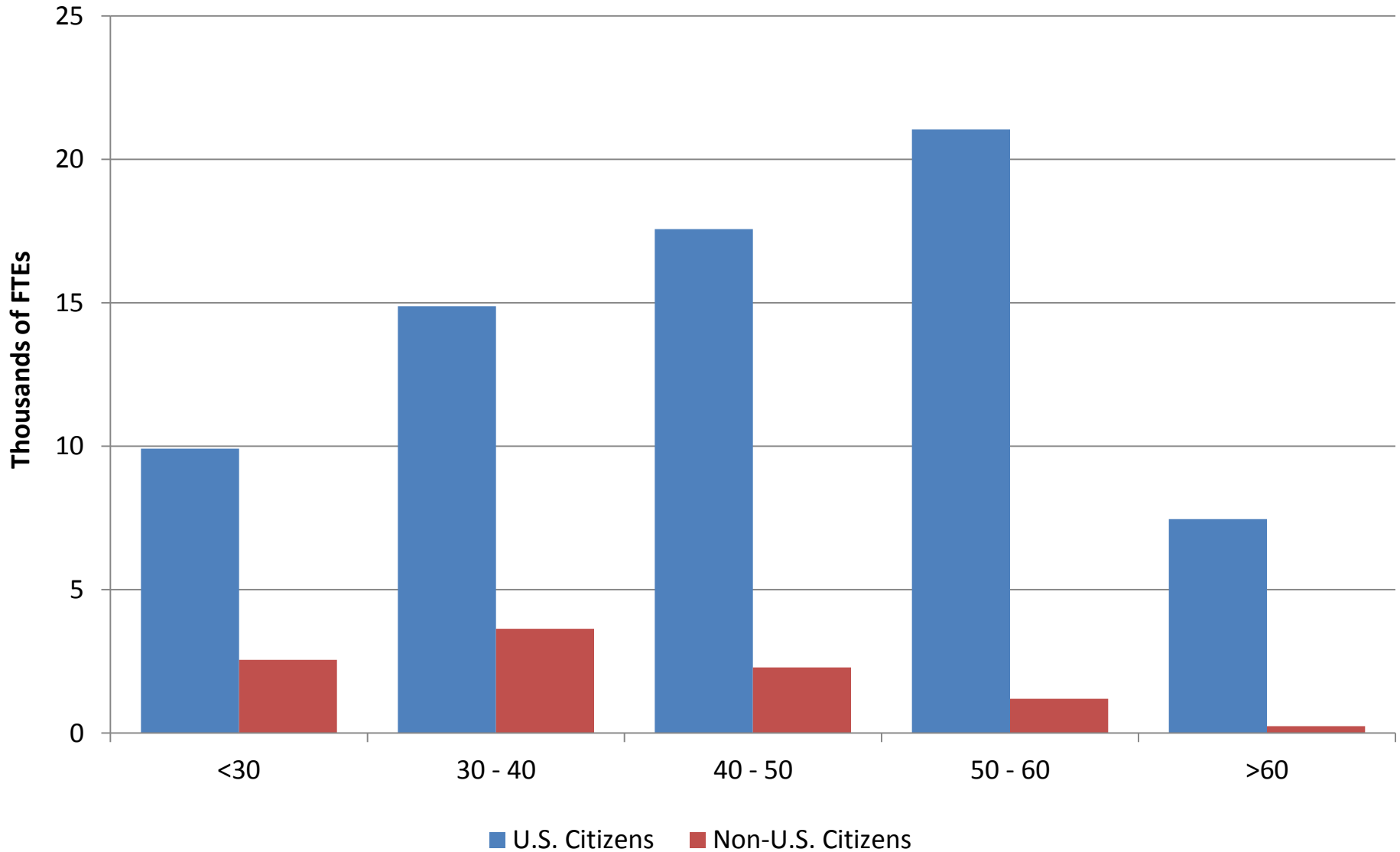
# Full Time Employees by Type



Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.



## Age Range of Engineers, Scientists, and R&D Staff\*



\* Excluding universities

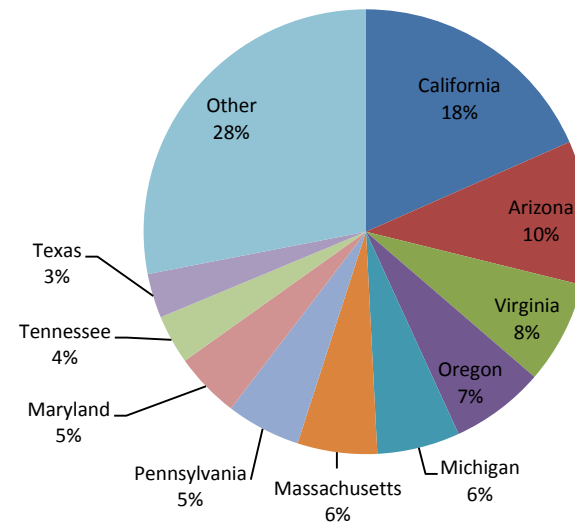
Source: U.S. Department of Commerce, Bureau of Industry and Security,  
*U.S. Space Industry Deep Dive*, Preliminary Data – October 2012.

# Unfilled Vacancies for Skill Positions

- We asked respondents to identify how many **unfilled vacancies** they currently have for the following positions:
  - Engineers, Scientists, and R&D Staff
  - Production Line Workers
  - Testing Operators, Quality Control, & Support Technicians
- 372 respondents (34 percent) **currently have 5,796 vacancies** for these positions.

Vacancies by Organization Size/Type	
Very Small	267
Small	76
Medium	512
Large	995
Very Large	2,517
Universities	1,429

**Vacancies by State (Excluding Universities)**



## Top 10 Issues and Challenges Affecting Respondents' Long-Term Viability

Domestic Competition

Proposed Cuts to U.S. Government Space Programs

Labor Costs

Variability of Demand

International Competition

Government Acquisition Process

Government Regulatory Burden

Health Care

Skills Retention

Taxes

\* Based on a weighted score.

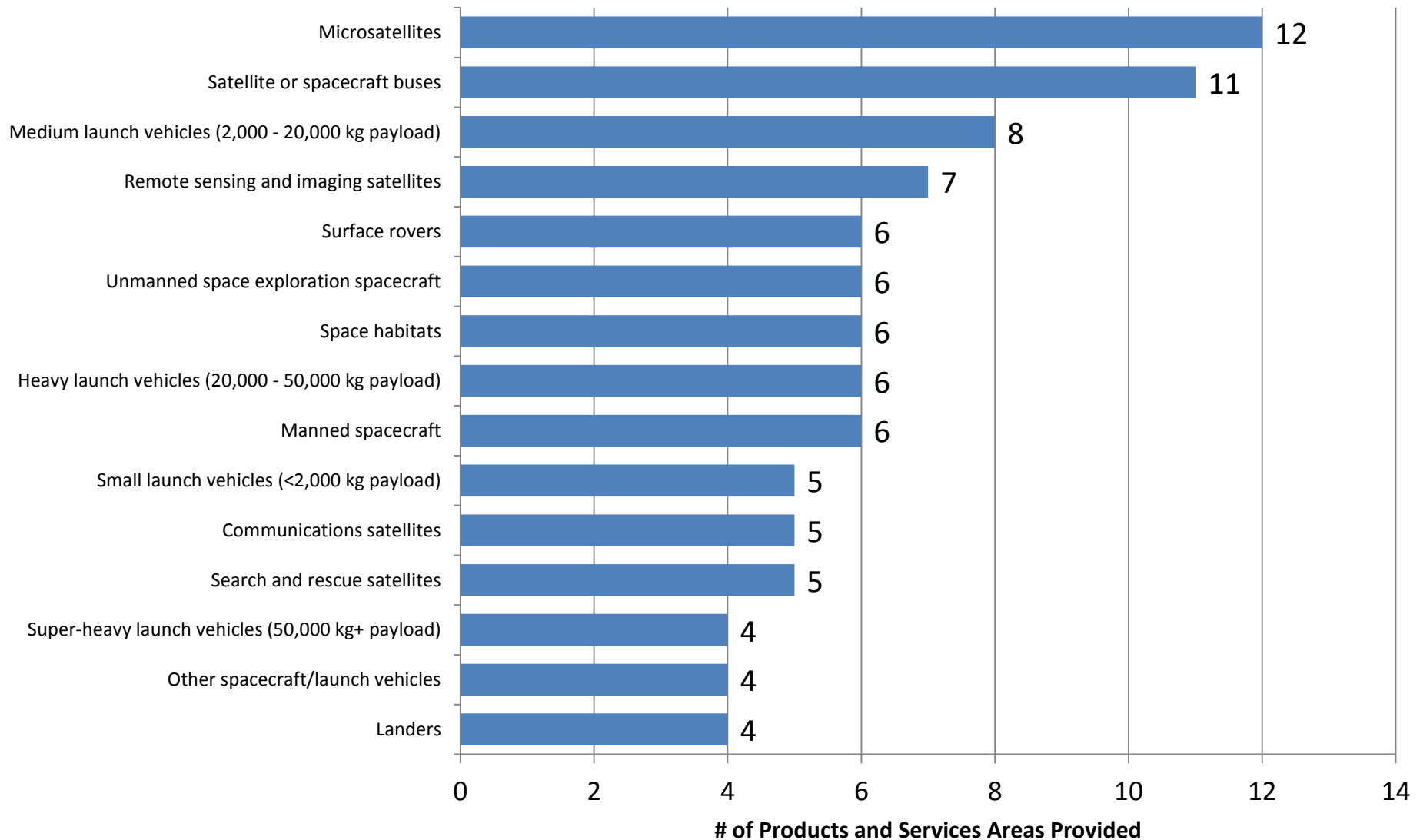
## Respondents Interested in Available USG Assistance Programs and Services

Program	# of Respondents
Business development	219
R&D programs	168
SBIR and STTR contracts	141
Global export opportunities	126
Manufacturing technology development	122
Export licensing (ITAR/EAR)	121
Financing	107
Training Opportunities	107
Marketing assessment skills	95
Product/service development	83
Government procurement guidelines and e-commerce	82
Patents and trademarks	65
Energy and environmentally conscious manufacturing	52
Country Commercial Guides	20

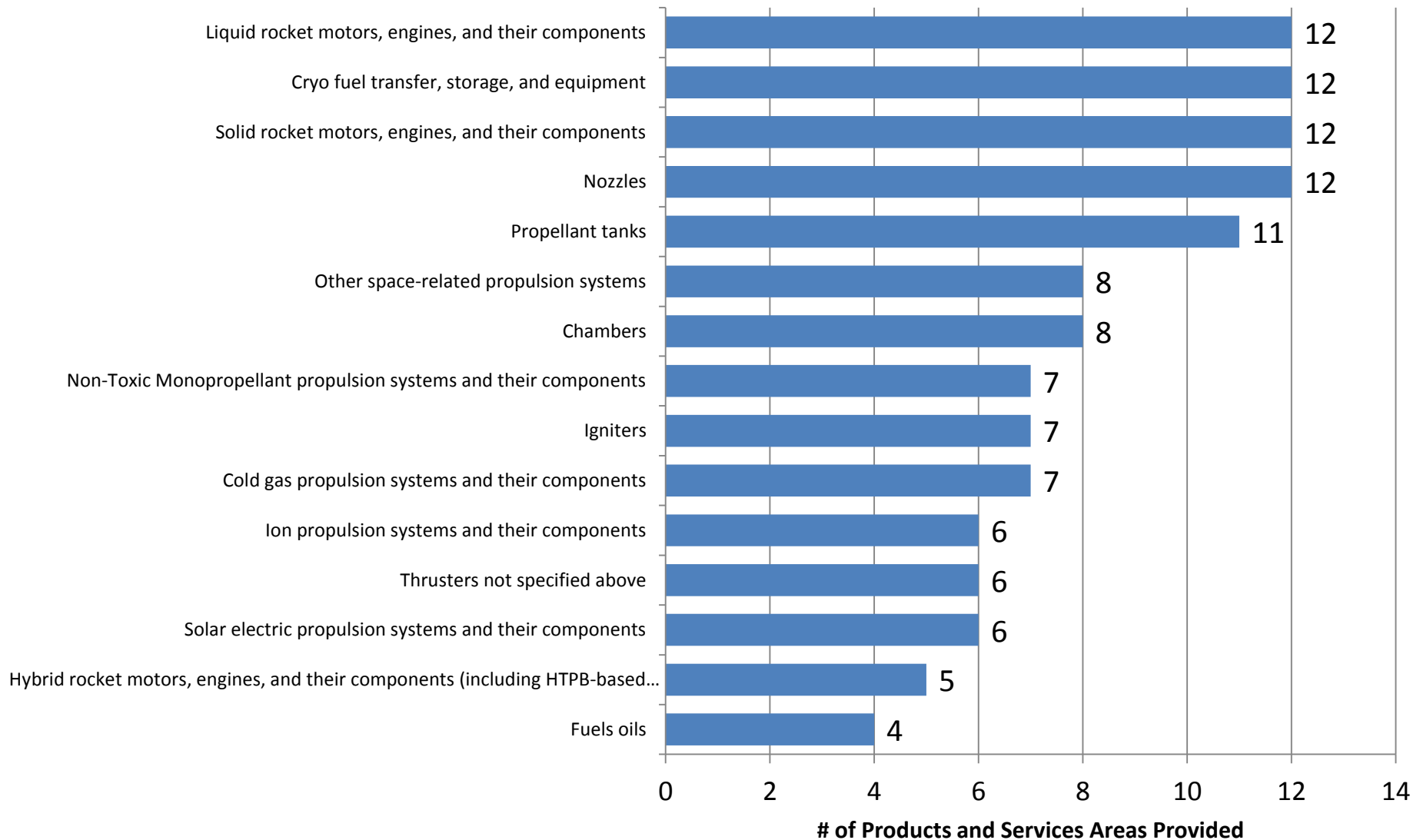
**Leverage existing USG resources to give something back to survey respondents.**

# Appendix

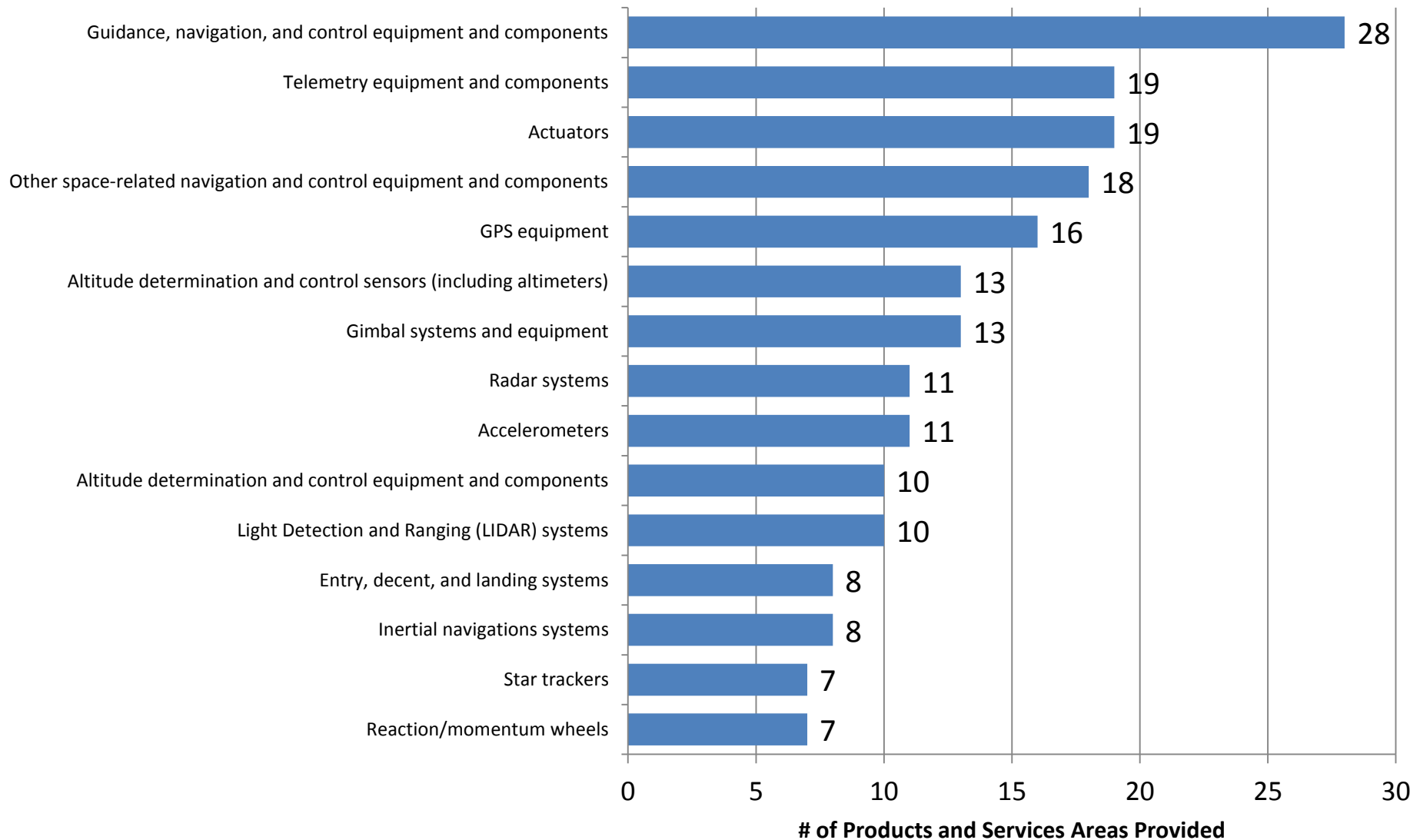
## Top 15 Product Areas Provided by Respondents – Spacecraft & Launch Vehicles



## Top 15 Product Areas Provided by Respondents – Propulsion Systems & Fuels

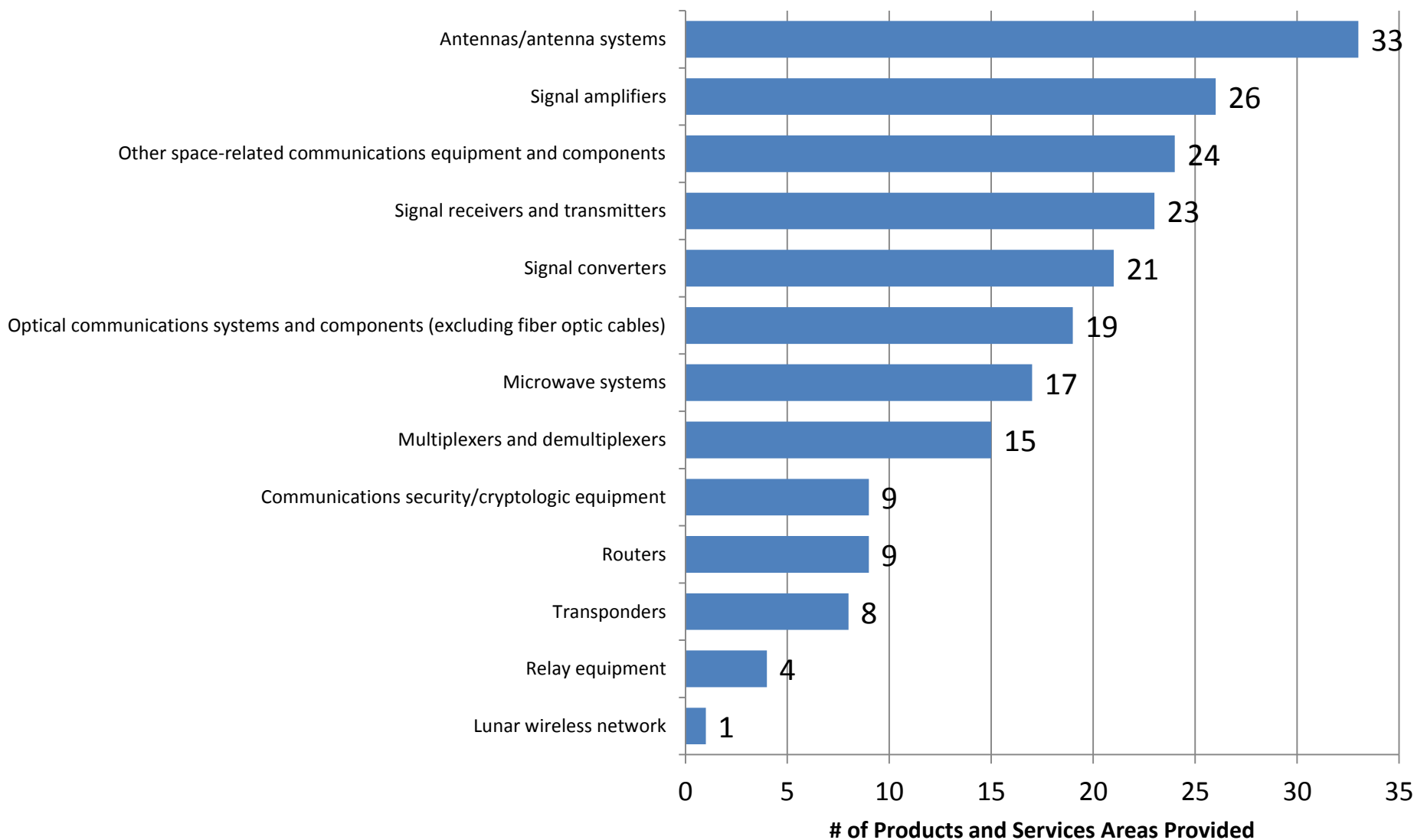


## Top 15 Product Areas Provided by Respondents – Navigation & Control Equipment



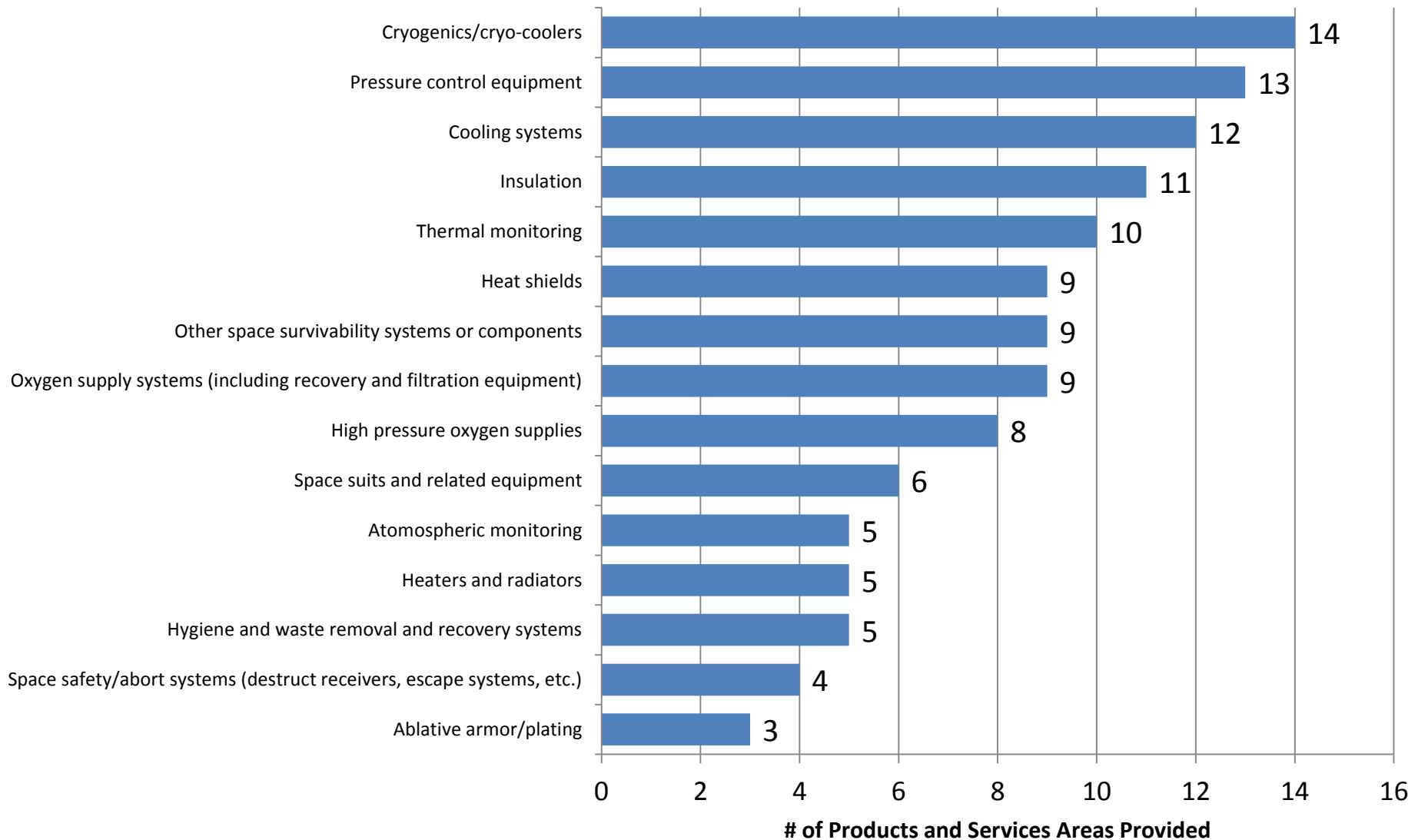


## Product Areas Provided by Respondents – Communications Systems

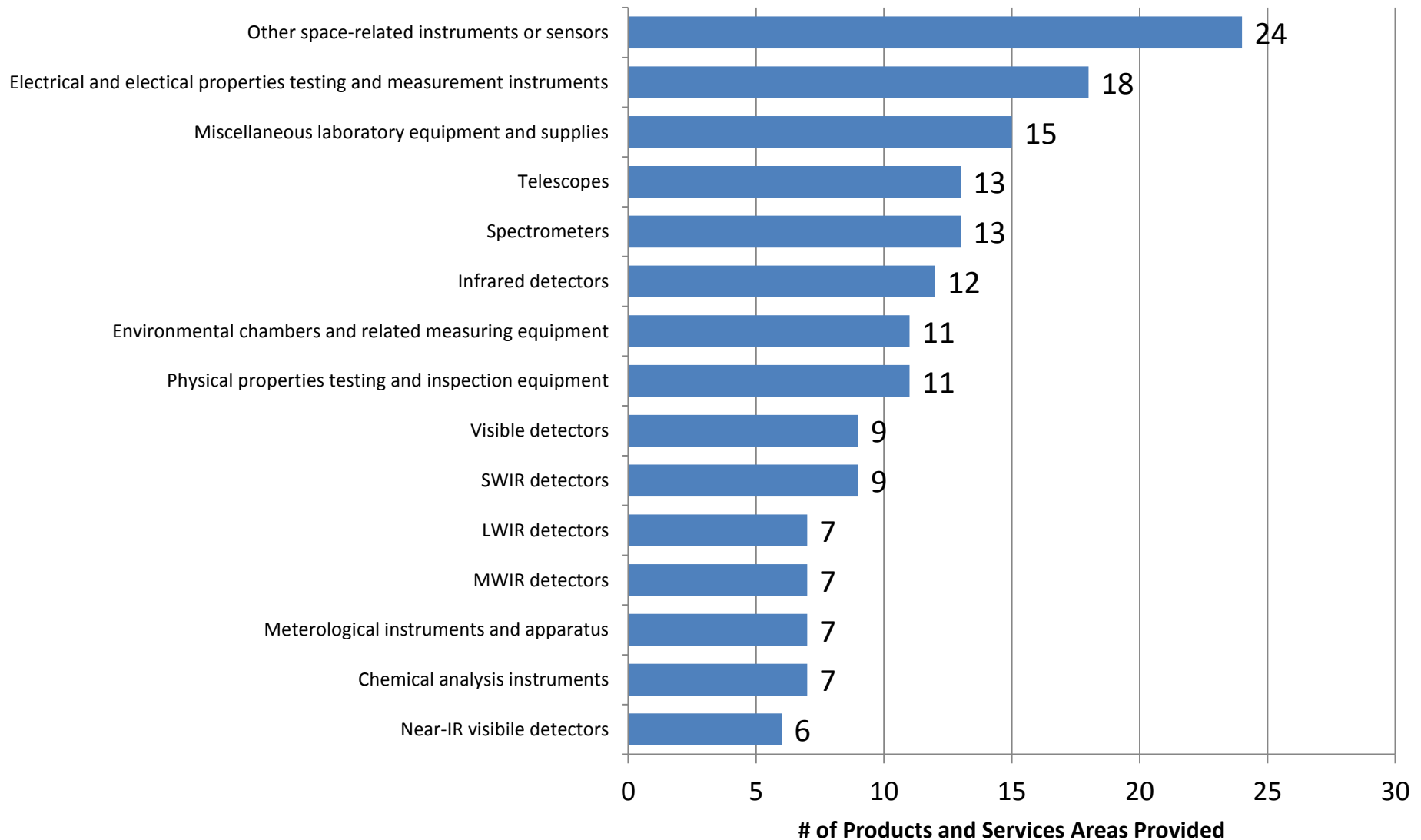


## Top 15 Product Areas Provided by Respondents

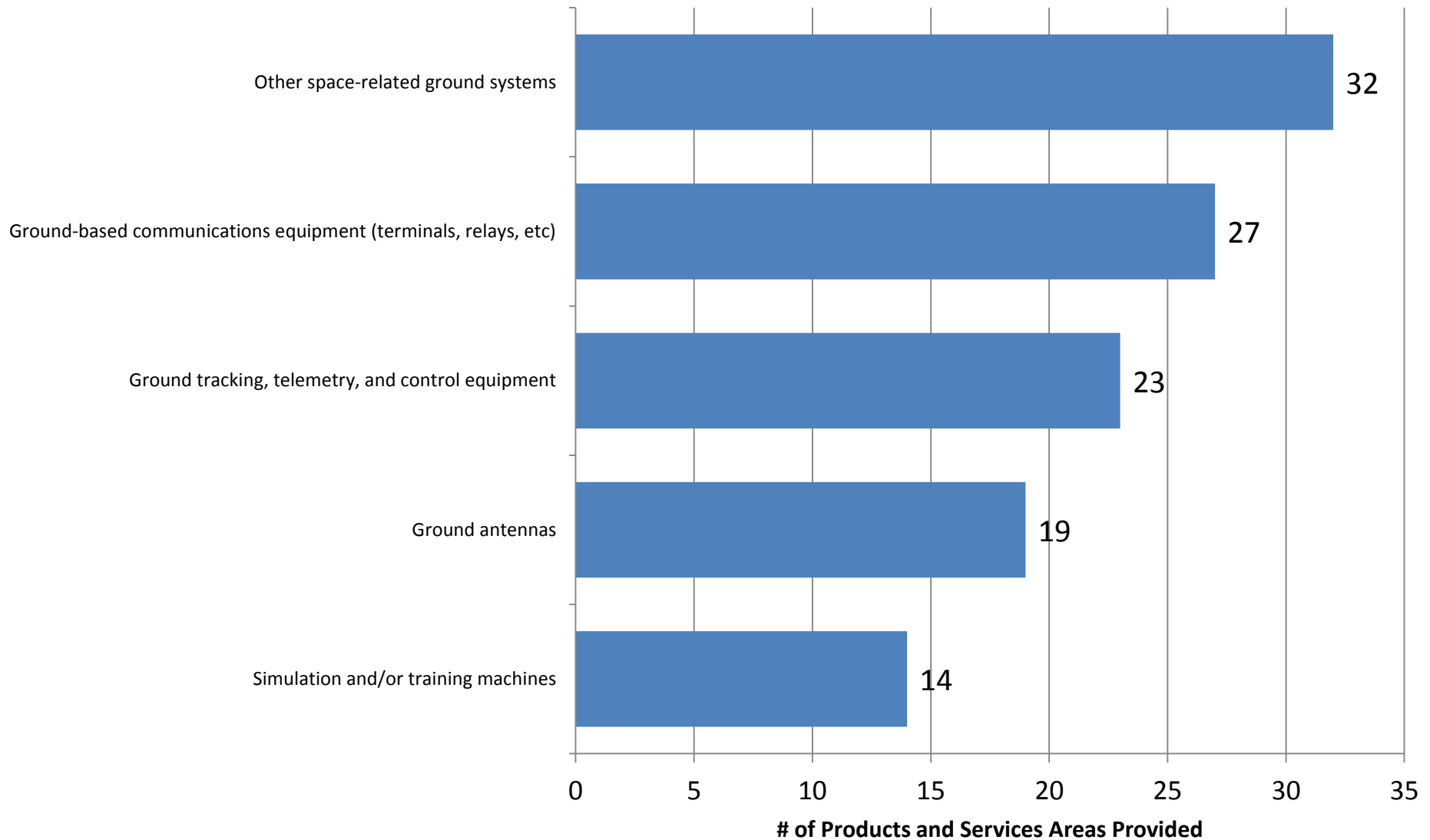
### – Space Survivability, Environmental Control/Monitoring, and Life Support



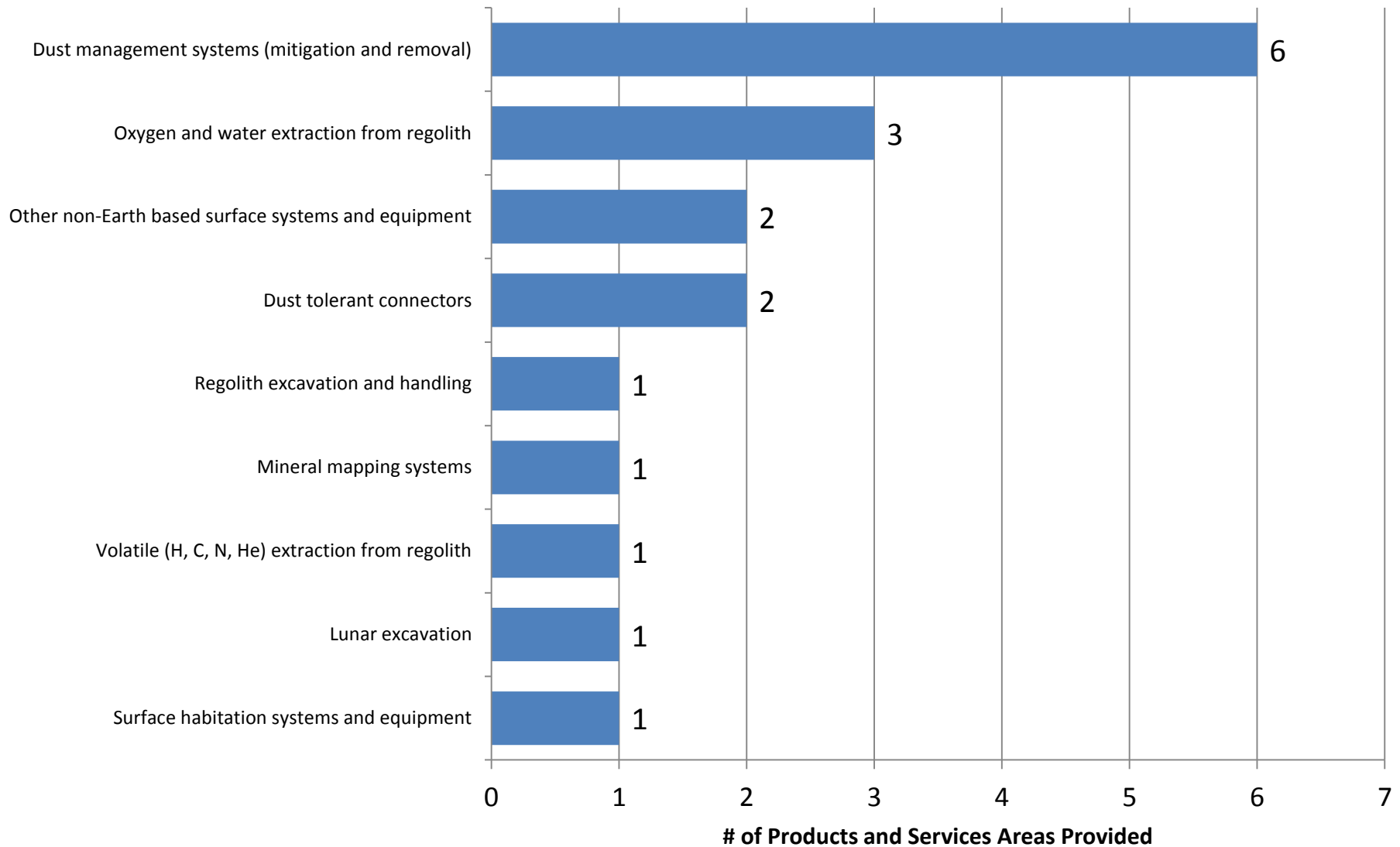
## Top 15 Product Areas Provided by Respondents – Payload Instruments & Measurement Tools



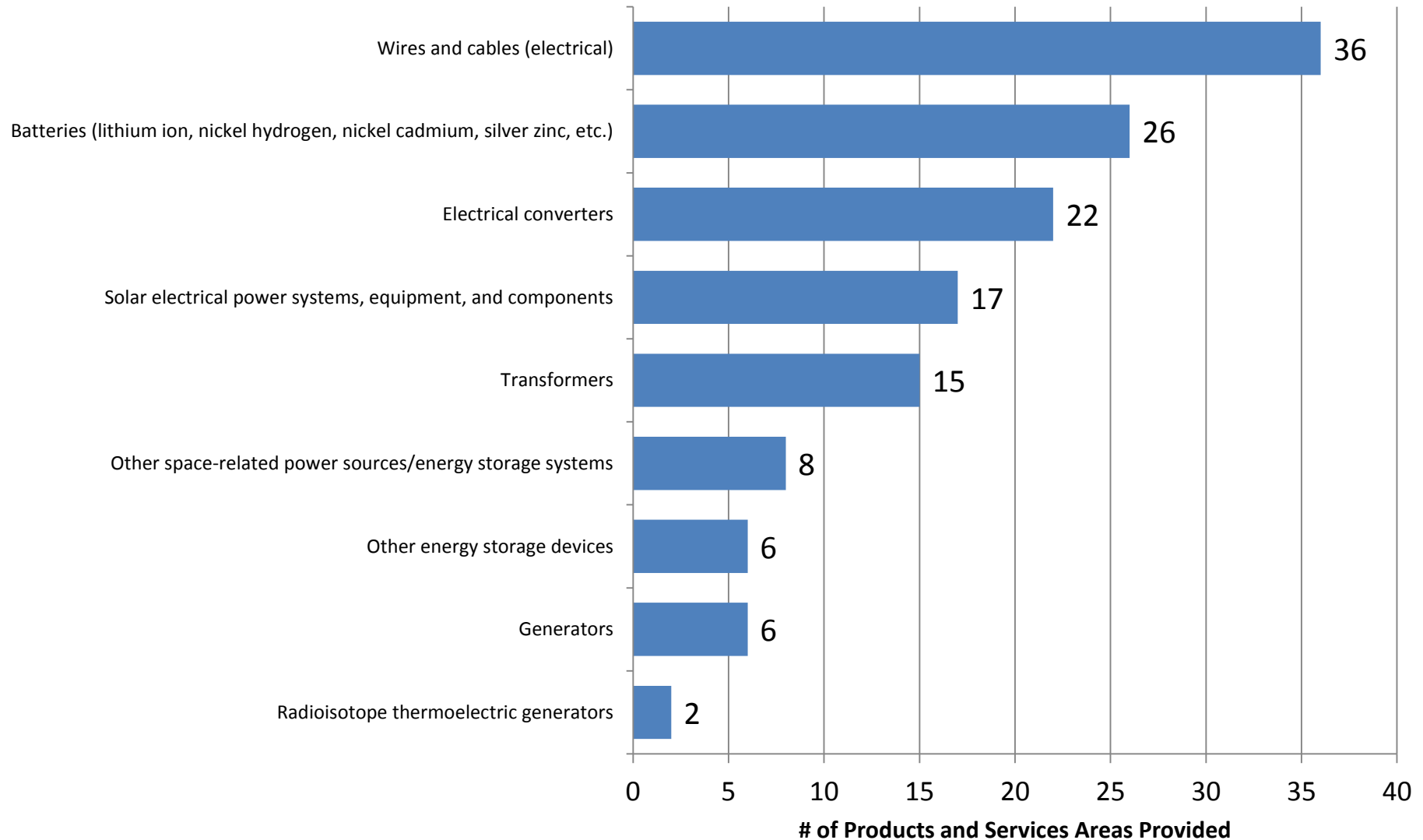
## Product Areas Provided by Respondents – Ground Systems



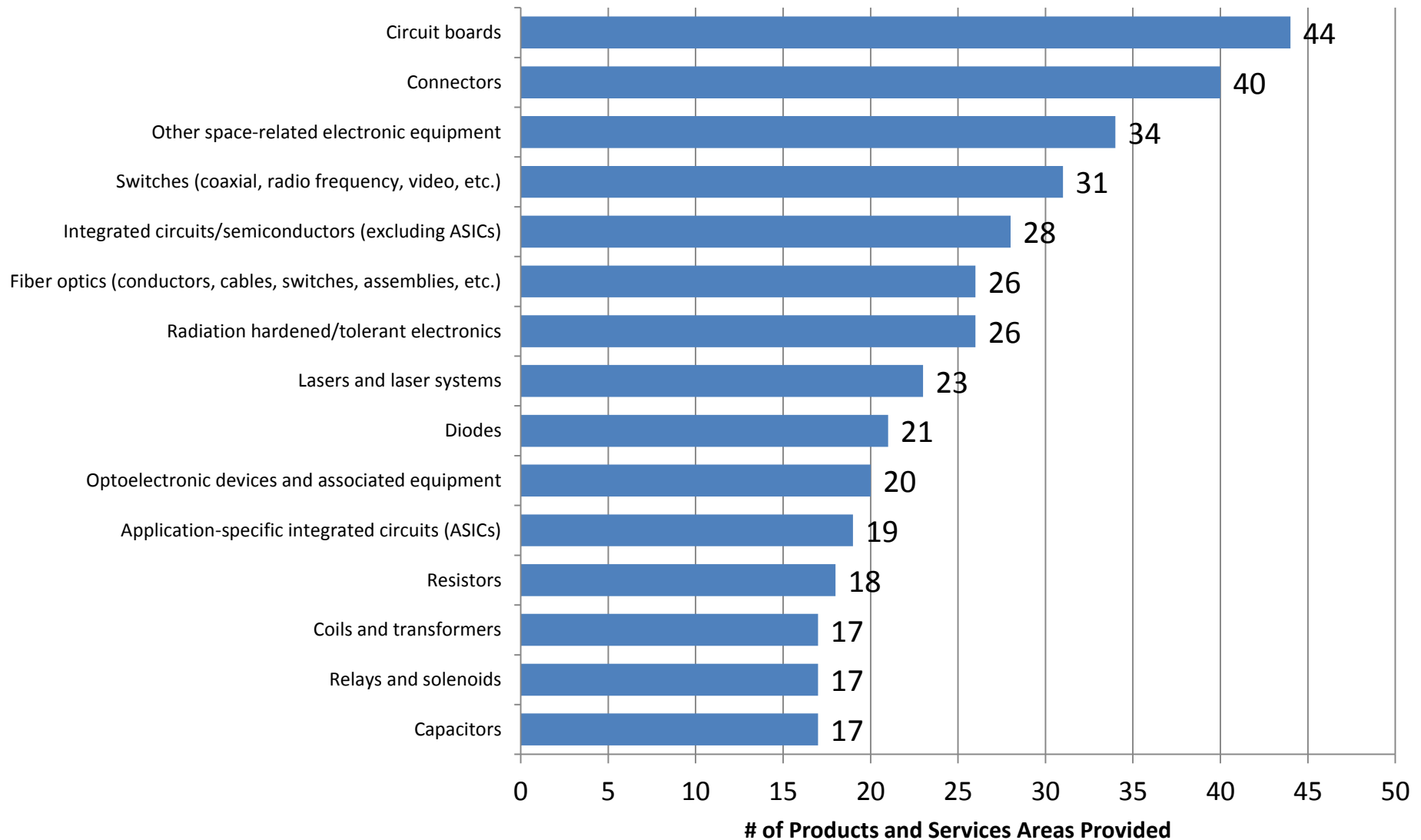
## Product Areas Provided by Respondents – Non-Earth Based Surface Systems



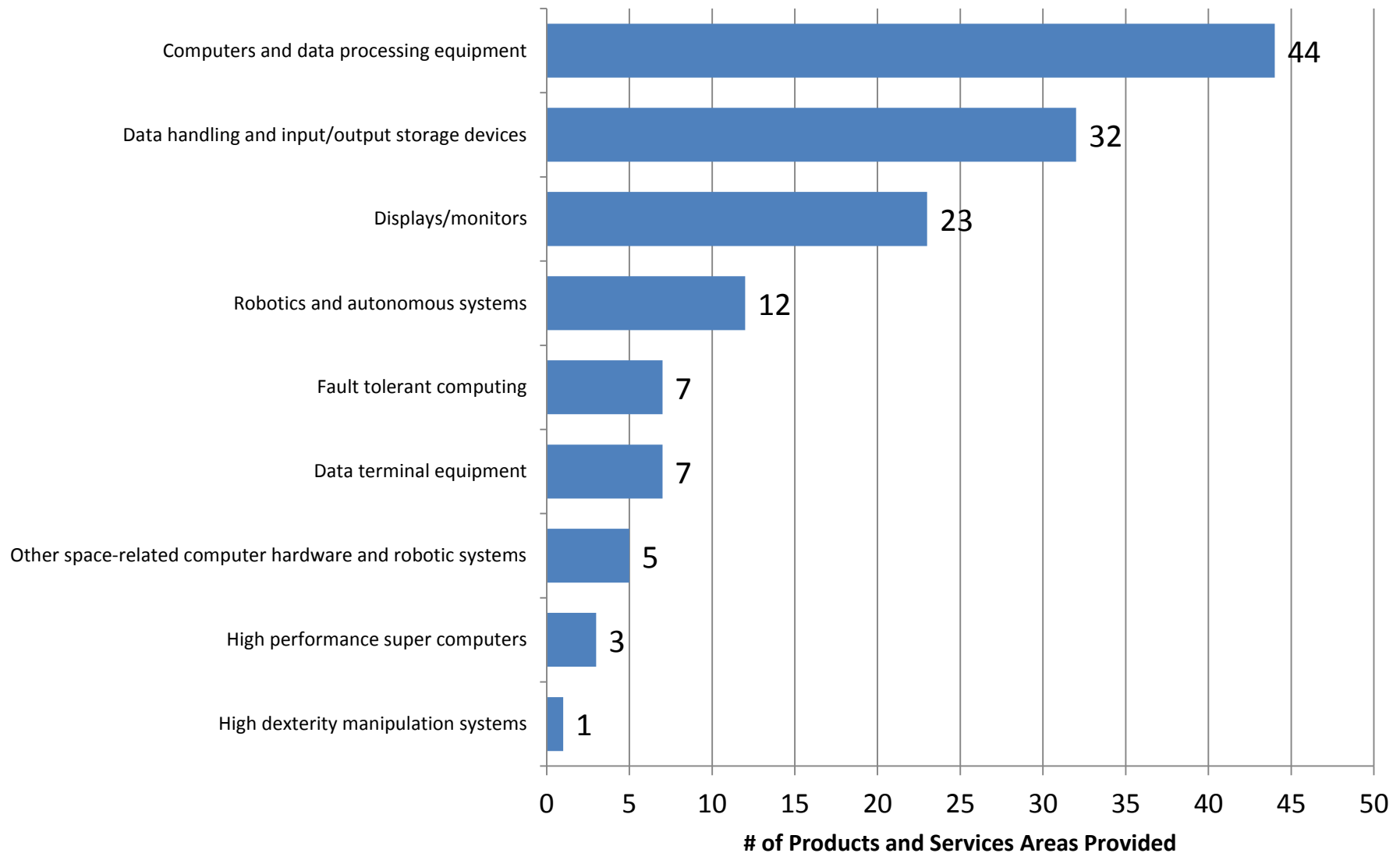
## Product Areas Provided by Respondents – Power Sources & Energy Storage



## Top 15 Product Areas Provided by Respondents – Electronic Equipment

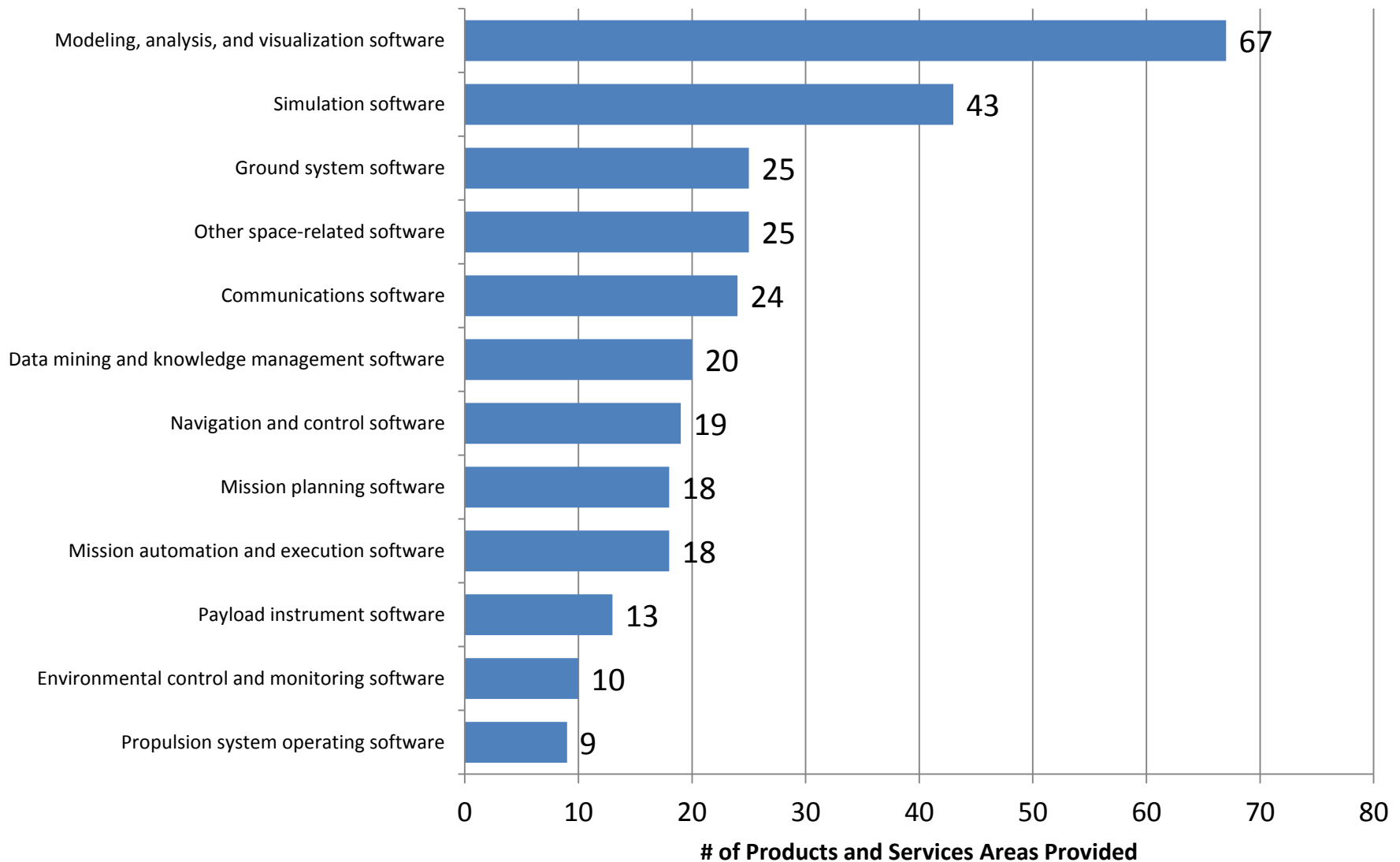


## Product Areas Provided by Respondents – Power Sources & Energy Storage

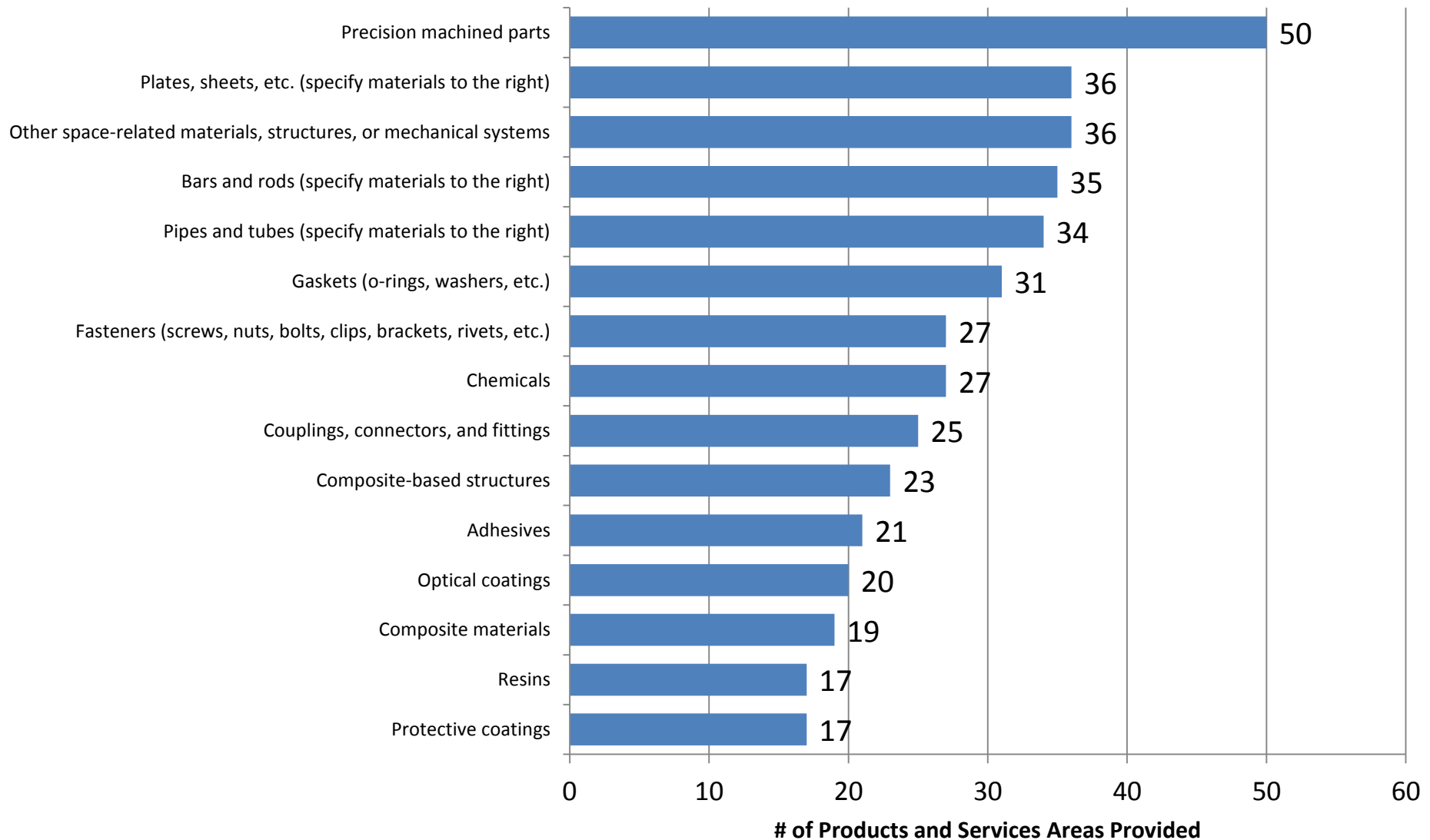




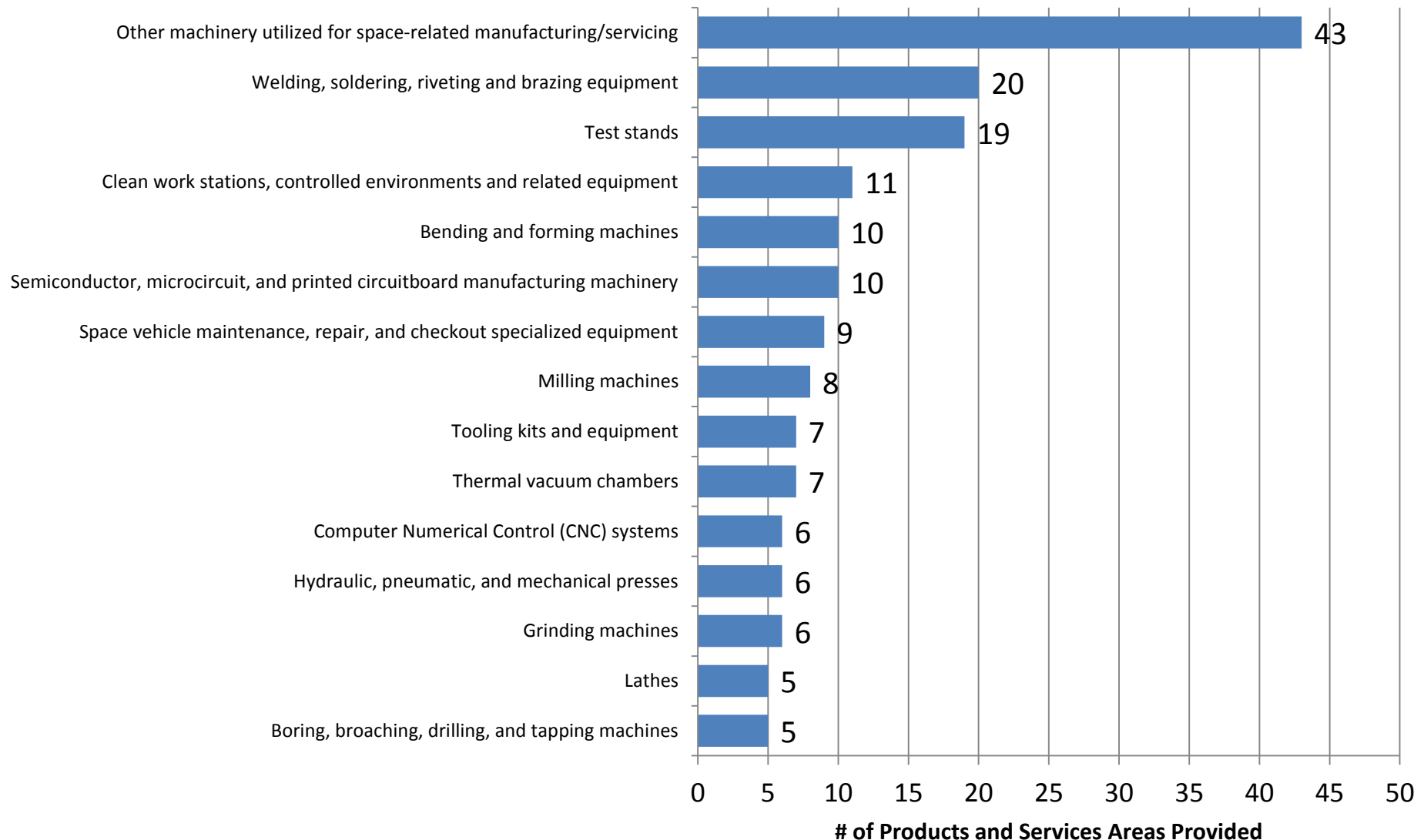
## Product Areas Provided by Respondents – Software



## Top 15 Product Areas Provided by Respondents – Materials, Structures, and Mechanical Systems



## Top 15 Product Areas Provided by Respondents – Manufacturing Tools & Specialty Equipment



## Top 15 R&D Areas Provided by Respondents

